DT Logger Host Instruction Manual PC Platform

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TABLE OF REVISIONS

Rev.	Revision History	Date	Prepared By	Approved By
H	Added battery life estimation data.	2019-Apr-12	MP	SP
I	Formatting changes to Section 8 to correct spacing issues.	2019-Jul-18	MP	SP
J	URL to download software updated (p. 3), removed “Contact Us” section.	2019-Aug-22	MP	CJ
K	Information about how battery life is dependent on data collection frequency added (p. 123), references to “battery status” indicator removed from all but DT2011B, Figure 1-1 updated (IC6656 removed, GAA added), specific loggers added to headings 3.2 and 3.3 for clarity, pin names clarified for DT2011B in 3.3. References to DT2033, Windows Vista and Windows XP removed. Removed DT2011 instructions.	2019-Dec-09	MP	KI, JT
L	Updated DT2485 sensor setup. Added IPI3 and IPI4 sensor support. Added sensor serials labels. Added DTSAA (Section 3.7, 5.8, Figure 1-1, Table 8-1). Removed MTCM. General formatting updates throughout.	2020-Aug-14	MP, PL	AB
M	Updated DT2485 sensor IPI3/4 sensor setup	2021-Jan-12	PL	
N	Updated DT2485 sensor setup with **beaded**stream and PLSA	2021-Nov-25	PL	
O	Added separate setup for new Tilt Meter	2022-11-14	PL	

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1 OVERVIEW

The RST Single Channel and Multi Channel Dataloggers were intended to be low cost, simple to use, battery powered data loggers, designed for reliable, unattended monitoring of a mix of vibrating wire sensors and thermistors. They are deployable in harsh environments and as compact as possible. The user-friendly software allows easy downloading of the data and maintenance in the field. Even users with very little experience with Geotechnical Instruments will be able to connect, download data and change settings with a matter of a few inputs.

DT Logger Host software is compatible with the following RST Instruments data loggers:

- DT2011 (discontinued, replaced by DT2011B)
- DT2011B (single channel logger, vibrating wire and thermistor)
- DT2055 (discontinued, replaced by DT2055B)
- DT2055B (10 channel logger, vibrating wire and thermistor)
- DT2040 (40 channel logger, vibrating wire and thermistor)
- IC6560 (uniaxial tilt logger)
- IC6660 (biaxial tilt logger)
- DTL201B-2B (uniaxial and biaxial tilt logger)
- MTCM (discontinued, mine tunnel convergence monitor and logger)
- DT4205 (10 channel logger, 4 to 20mA and thermistor)
- DT2306 (18 channel potentiometer logger)
- DT2485 DT-BUS logger
- DT2033 Wireless Downhole logger
- DT2350 Strain logger
- GAA2820 Slope Monitoring System
- DTSAA Shape Array Logger

Supported loggers are shown below for a reference.

Figure 1-1 – Supported data loggers

2 HOST SYSTEM REQUIREMENTS

2.1 PC HARDWARE

- Desktop or laptop with Intel or AMD processor.
- USB port.

2.2 WINDOWS HOST OPERATING SYSTEM

The following Microsoft™ Windows operating systems are supported:

- Windows 7 (x86 and x64)
- Windows Server 2008 R2 (x64)
- Windows 8 (x64)
- Windows Server 2012 R2 (x64)
- Windows 8.1 (x64)
- Windows 10 (x86 and x64)

3 QUICK-START INSTRUCTIONS

The following is a brief outline with references to other parts of this manual to get you up and running quickly with the RST Data loggers:

3.1 SOFTWARE INSTALLATION

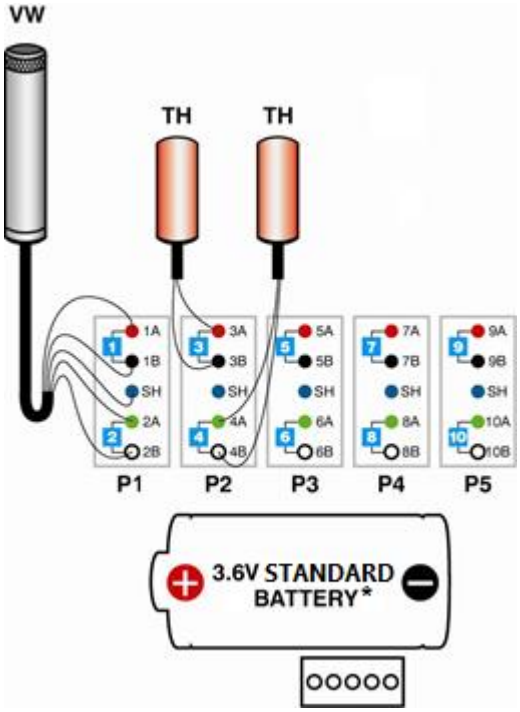
1. Run the software installation file RST*_DTLogger_Setup_X.XX.X.exe,*
   where X.XX.X indicates current software version
   Current version can be downloaded from:
   https://rstinstruments.com/resources/software. Navigate to the site and select the appropriate data logger.
2. Follow the on-screen instructions to install the software. The default directory is:
   C:\Program Files (x86)\RST Instruments\DT Logger Host

NOTE: The DT Logger Host software requires a set of drivers installed on the host computer in order to communicate over USB communication port.
If automatic driver update is enabled, and an internet connection available, RST USB drivers will be downloaded from Microsoft™ Windows Update server and

Contact RST Instruments with any questions or concerns.

3.2 DT2011B, DT2055, DT2055B, AND DT2040 VIBRATING WIRE AND THERMISTOR DATALOGGER SETUP

1. Remove the cover of the data logger by the four Phillips screws.
2. Insert the stripped ends of the cable for the VW Transducer or thermistor sensor through the cable gland and attach them to the terminal strip as shown below.



Terminal ID	Wire Colour
1A	Red
1B	Black
SH	Bare (shield)
2A	Green
2B	White

*See Section 8 for more information about batteries.

Figure 3-1 – VW and TH sensor connections

3. Using the supplied USB cable, connect the data logger to your computer's USB port. Follow the steps in Section 10 to install USB Controller drivers.
   Click the logger image to change to Multi Channel logger mode.

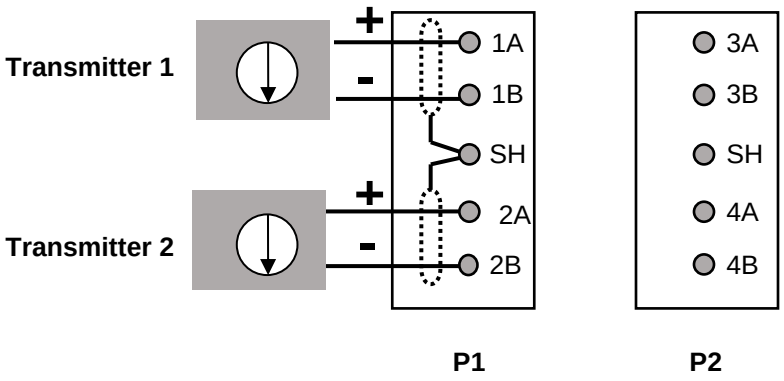
3.3 IC6560, IC6660, DTL201B, AND DTL202B TILT LOGGER SETUP

Tilt Logger contains internal MEMS tilt sensors; therefore, there is no need for external wiring. Click tilt logger image to change to tilt logger mode.

3.4 DT4205 4-20MA LOGGER SETUP

Follow the same steps as in Section 3.2.

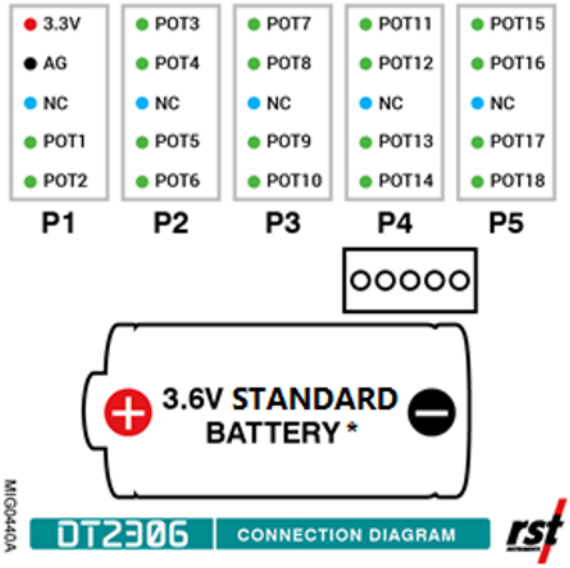
The DT4205 is designed to work with loop-powered (2 wire) 4-20 mA transmitters and NTC thermistors in any mix. Thermistors are non-polarized, but 4-20 mA transmitters typically require correct connection polarity. Refer to Figure 3-2.



The shield from each transmitter can be connected to the shield terminal. See connections in Figure 3-2.

Figure 3-2 – 4-20 mA sensor connections

3.5 DT2306 POTENTIOMETER LOGGER SETUP



*See Section 8 for more information about batteries

Figure 3-3 – DT2306 sensor connections

3.6 DT2485 AND DT2033 DT-BUS DATALOGGER SETUP

1. Remove the cover of the data logger by the four Phillips screws.
2. Insert the stripped ends of the cable for the RS485 bus through the cable gland and attach them to the terminal strip. Where:

Table 3-1 – Wiring colours for DT-BUS datalogger

Terminal ID	Wire Colour	Alternative Wire Colour
SH	Bare (shield)	Bare (shield)
7V	Red	Brown
GND	Black	White
B	White	Black
A	Green	Blue

3.7 DTSAA SHAPEARRAY LOGGER

1. Loosen the four Phillips screws to remove the cover of the data logger.
2. Insert the stripped ends of the ShapeArray cable through the cable gland and clamp them into the terminal block following the wiring colours described on the terminal block label (Table 3-2):

Table 3-2 – Wiring colours for DTSAA

Terminal ID	Wire Colour
WHT	White
BLU	Blue
BLK	Black
RED	Red
SH	Bare (Shield)

3. Tighten the cable gland according to the installation guide.
4. Replace the lid and use the four Phillips screws to secure in place.

3.8 DT2350 STRAIN GAUGE DATALOGGER SETUP

1. Remove the cover of the data logger by the four Phillips screws.
2. Insert the stripped ends of the cable for the loadcell through the cable gland and connect to logger plugs as shown on following diagram.

NOTE: When connecting 4-wire sensors, ignore PS+ and PS- terminals.

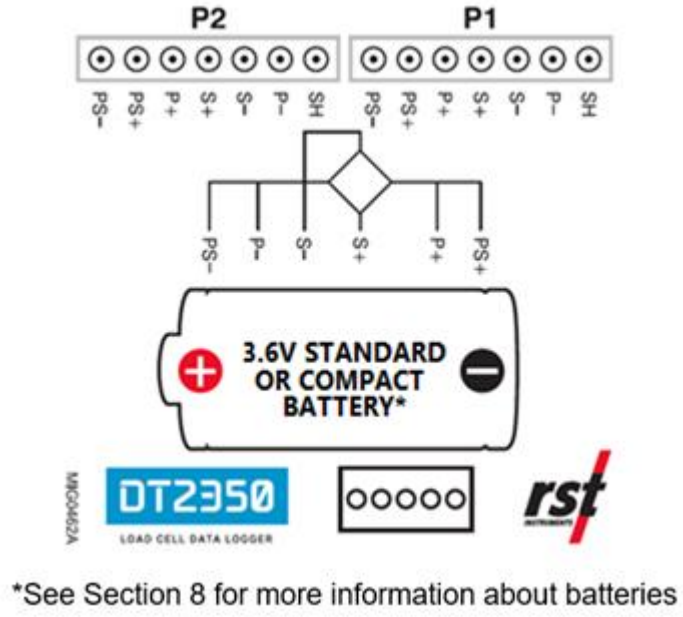


Figure 3-4 – DT2350 sensor connections

3.9 DATALOGGER CONFIGURATION

1. Launch the software. Once connected, the port and status indicators turn green and the *Status* screen should display logger information. See Section 9 for connection troubleshooting.
2. Navigate to the *Sensors* tab and setup all attached sensors parameters. Once the desired parameters are set, press the *Upload to Logger* button to apply the changes and start logging.
3. If you wish to record the data in specific Engineering Units, enable the *Eng Units* and enter the appropriate parameters and press the *Upload to Logger* button to update the logger.
4. Go to Logging tab and check that logging parameters are correct and change them if necessary. If changes were made, Press the *Apply Settings* button to apply settings and restart logging.
5. If desired, live sensor reading can be monitored in real time by selecting the *Monitor* tab.
6. Under the *Status* tab, check to make sure the parameters are correct, and that the logger is either *logging* or there is a *log pending*.
7. Click *Disconnect* button to terminate logger connection.
8. Exit the software and disconnect the communication cable.
9. The data logger should now be taking readings. Return when desired to download the data. Make the habit of checking the battery remaining life every time you connect. The battery state is an approximate value based on recent battery use.

3.10 DOWNLOADING DATA

1. Connect the communication cable to your computer and the data logger and launch the software. If the connection is successful, the port and status indicators turn green and the *Status* screen should display logger information.
2. Press the *Collect Data* button to download the data. A data file (*.csv) will automatically be created in the data directory. The default data directory is: **My Documents\Multichannel**
3. Before downloading, the program will prompt you whether you would like to erase the existing data on the logger or keep appending to existing records. Alternatively, if you wish to erase the old data and continue logging with the same parameters, select the *Logging* tab and press *Apply Settings.*
4. If you wish to keep the old data on the logger and continue logging, exit the program and disconnect the communication cable.
5. If you wish to change any logging parameters, do so under the *Logging* tab and press *Apply Settings* to save the changes.
6. Disconnect the communication cable when finished.

3.11 HELP SYSTEM

Extensive help system can be activated anytime by pressing F1 or help icon. Answers to common problems and troubleshooting tips can be found by browsing help topics or searching using keywords.

4 DATALOGGER CONNECTION

Single and multichannel loggers can be connected using communication cable or optional wireless module.
The Connections tab enables the user to change logger settings and access advanced features

CSV Data File Folder
The location of *.csv file data folder can be changed using *Data File Folder* dialog box. Press *Browse…* to change or create new folder. By default, data files are saved to:
My Documents\Multichannel

Options button list expands to show following entries:

Logger Options
Monitor Mode (DT2040 only)
Two monitor modes are made available for large channel number logger (DT2040). Sequential (standard mode) displays 10 consecutive channel monitor data. Pick mode allows selecting up to 10 channels from active sensor pool.

Advanced Options
The DT Logger Host software includes special features for advanced troubleshooting and data retrieval. They are to be used with assistance of RST Instruments technical staff in case of corrupted data.

Default Settings
Restores default logger settings.

Change Admin Password
The option is given to protect Logging and Sensor settings with user defined password.

Please memorize or store password in safe place. If Admin password is forgotten, call RST Support.

Other Options for all logger types
Fahrenheit temperature units setting causes all temperatures displayed and saved in Fahrenheit temperature scale.

Wireless Settings
RSTAR Array Radio Series system configuration settings. For further information on RSTAR settings, see Section 7.
DT Link remote logger access. Please refer to section 7.2 for advanced DT Link settings explanation.

Software Update Check
Click *Check now* to find out if software update is available for automatic download and installation. To change online update options, click *Update Options*.

4.1 WIRED CONNECTION

All loggers can be connected to the host computer using USB cable.

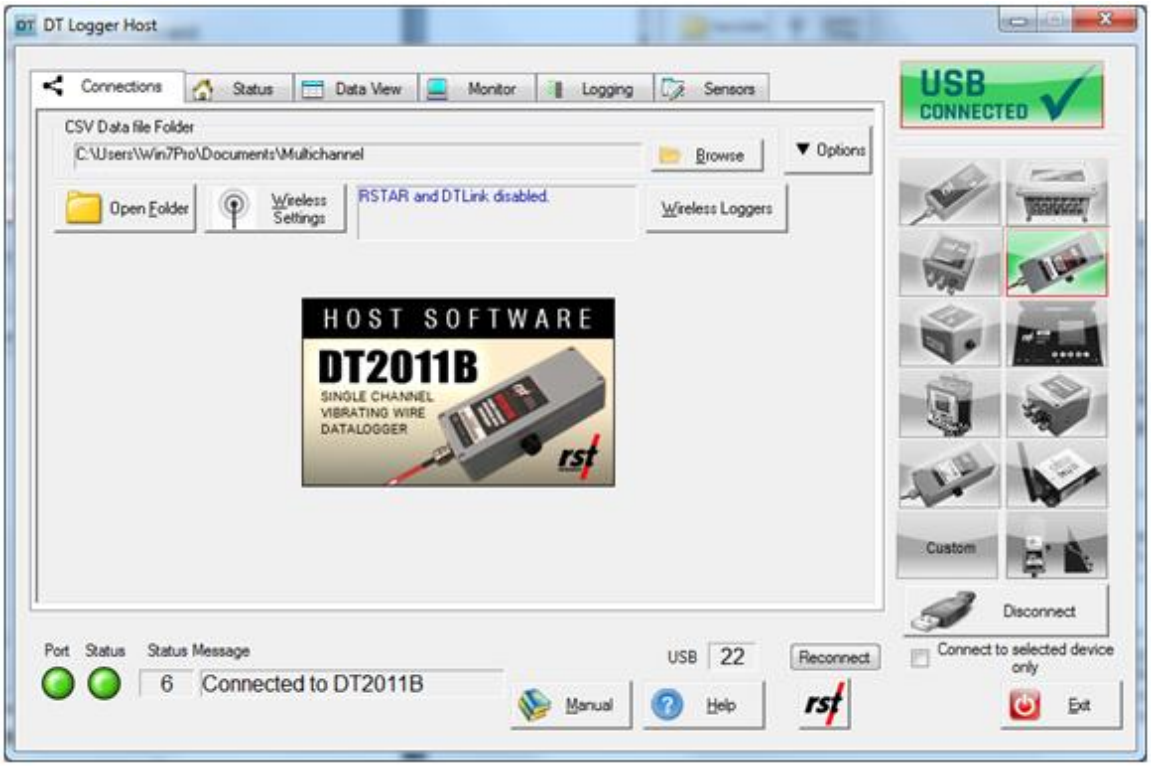


Figure 4-1 – Connections tab – wired

Wireless button will show settings dialogs for changing various wireless settings.

4.2 WIRELESS CONNECTION USING RST DT LINK MODULE

With optional wireless module installed and configured, a host computer connected to the DT Link HUB will have wireless access to the user selected loggers.

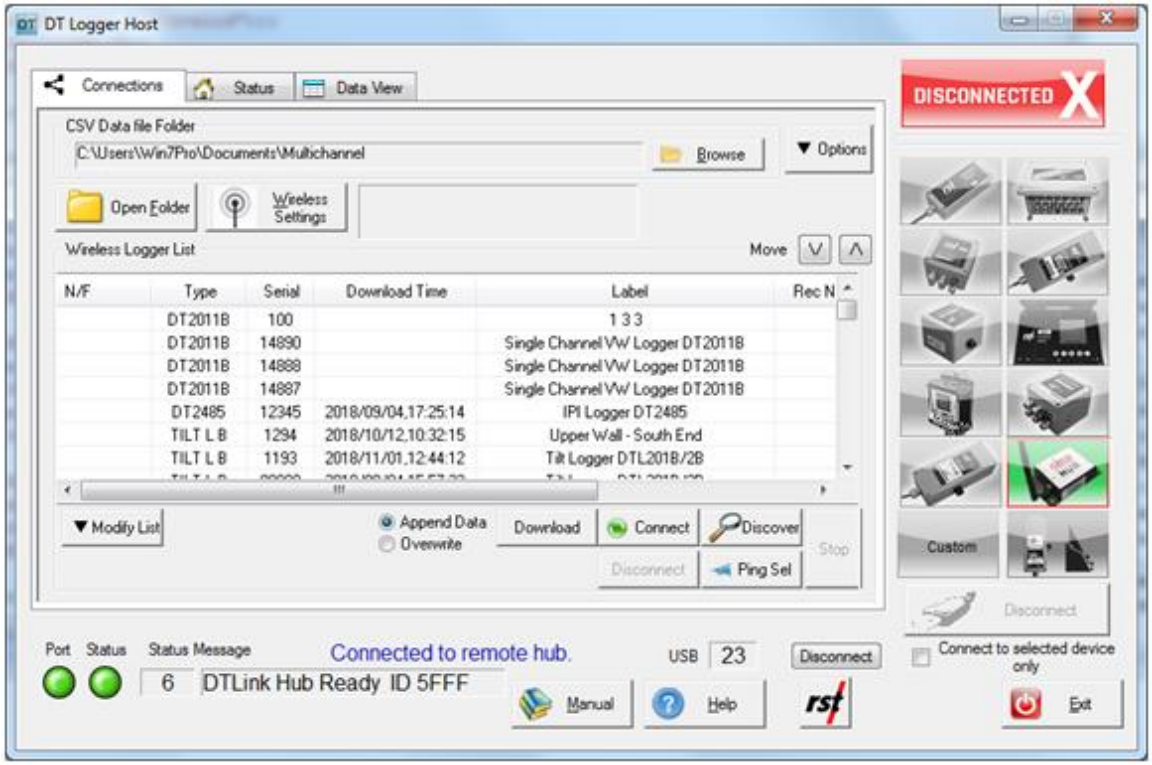


Figure 4-2 – Connections tab – wireless DT Link

NOTE: When “Connect to selected device only” is enabled, the software will connect to the logger selected in logger picture list. Any other loggers will be ignored.

Wireless Logger List

Logger list can be updated manually using *Modify List* button.
More convenient automatic logger search can be initiated using *Discovery* button.
The list entries consist of logger type, logger serial number, data download time, logger label, record number, radio MAC address and network ID. Discovery search indicates found (F) and new (N) loggers. Selected logger entries can be sorted using /\ and \/ buttons.

Ping

To verify logger accessibility, click *Ping Sel* button. The software will try to retrieve basic information from selected logger: Download Time, Record Number, Label and wireless signal strength. Click *Stop* to stop pinging.

Connecting loggers

Click *Connect* button to establish wireless communication link with selected logger. Upon successful connection, logger status is retrieved, and the software will automatically switch to Status tab. Click *Disconnect* button to disconnect and switch back to wireless logger list.

Download

For speedy data download, click *Download* button. The software will connect to selected logger, download all data to a file and disconnect wireless connection. Select Append radio

button to keep historical data or select Overwrite radio button to restart logging after data download.

Download All
For automatic data download, click *Download all* button. The software will connect to loggers indicated by check mark, download all data to a file and disconnect wireless connection. Select Append radio button to keep historical data or select Overwrite radio button to restart logging after data download. Click *Cancel* to interrupt download process

Wireless Settings
Wireless button will show settings dialogs for changing various wireless settings. Please refer to section 7.2 for advanced DT Link settings explanation.

4.3 WIRELESS CONNECTION USING RSTAR SYSTEM

The RSTAR Array Radio Series use wireless technology to provide continuous data acquisition. Please refer to section 7 for RSTAR system details.

4.4 OPTIONS

Logger Options for all logger types
Fahrenheit temperature units setting causes all temperatures displayed and saved in Fahrenheit temperature scale.

Monitor Mode (DT2040 only)
Two monitor modes are made available for large channel number logger (DT2040). Sequential (standard mode) displays 10 consecutive channel monitor data. Pick mode allows selecting up to 10 channels from active sensor pool.

Use local status cache for USB connections (DT2485 only)
Enabling local status cache will shorten initial logger connection time. When used with high number of sensors, connection time will be reduced significantly.

Advanced Options
The DT Logger Host software includes special features for advanced troubleshooting and data retrieval. They are to be used with assistance of RST Instruments technical staff in case of corrupted data. The remaining advanced settings can be adjusted to fit custom situations

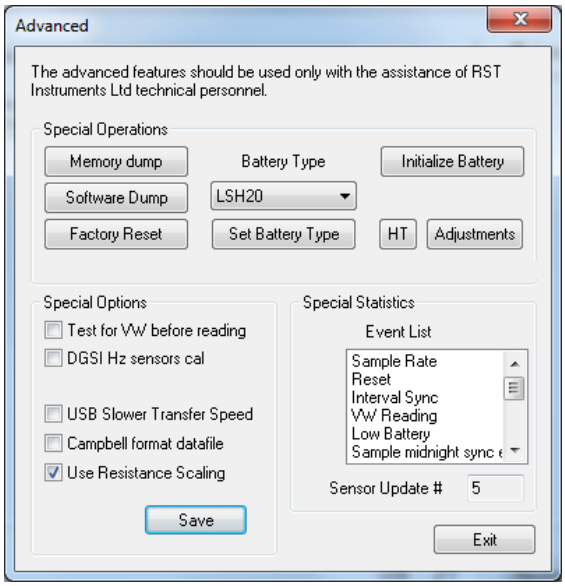


Figure 4-3 – Advanced options

- *Memory Dump: Download memory image to a file. Used for data recovery.*
- *Software Dump: Create and submit software snapshot for diagnostic purposes.*
- *Factory Reset: Reset logger to factory defaults erasing all data and settings.*
- *Battery Type*: When replacing with different battery type, Select battery type from the list and click *Set Battery Type*.
- *Initialize Battery*: To be used after installing new battery.
- *Test for VW before reading*: adds additional test for VW sensor connection
- *DGSI Hz sensors cal*: Changes VW sensors output to Hz. Default output is B units.
- *USB Slower Transfer Speed*: Throttle USB bandwidth for slower laptops.
- *Campbell format datafile*: Generate *.dat file in addition to *.csv file.
- *Use Resistance Scaling*: Apply resistance calibration to thermistor readings.
- *Adjustments*: Advanced settings for specific situations.
- *HT*: Logger command shell.

Change Admin Password
The option is given to protect Logging and Sensor settings with user defined password. Please memorize or store password in safe place. If Admin password is forgotten, call RST Support.

Software Update Check
Click *Check now* to find out if software update is available for automatic download and installation. To change online update options, click *Update Options*.

4.4.1 ADJUSTMENTS

The Adjustment dialogs allow fine tuning of various logger parameters. They are to be used with advice from RST Instruments technical personnel.
Each setting has a default value specified.

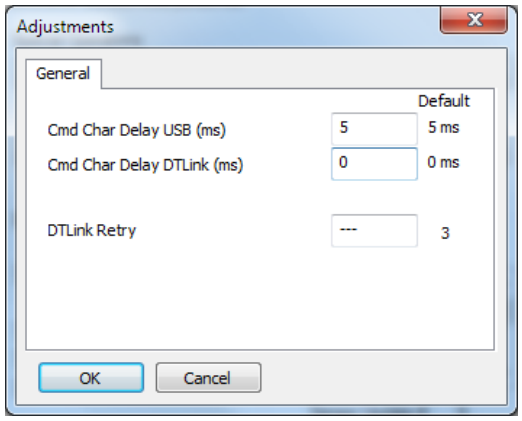


Figure 4-4 – Adjustments – general VW and TH loggers

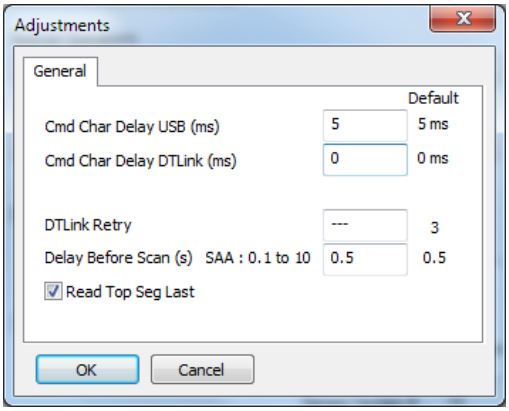


Figure 4-5 – Adjustments – general DTSAA logger

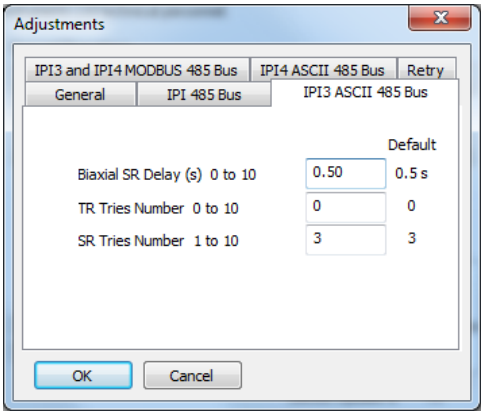


Figure 4-6 – Adjustments – IPI3 ASCII, DT2485 logger

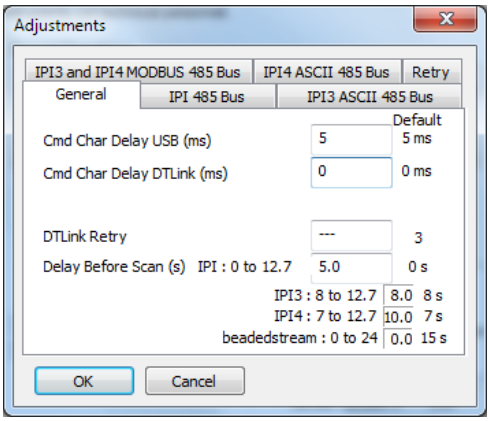


Figure 4-7 – Adjustments – general DT2485 logger

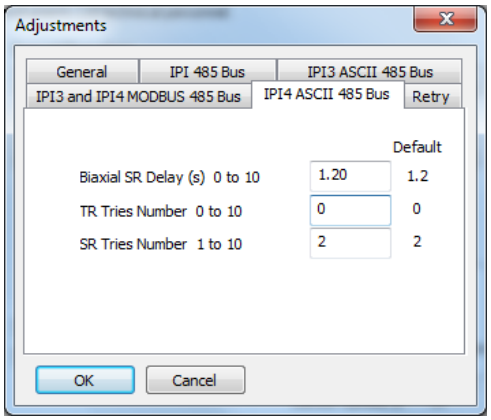


Figure 4-8 – Adjustments – IPI4 ASCII, DT2485 logger

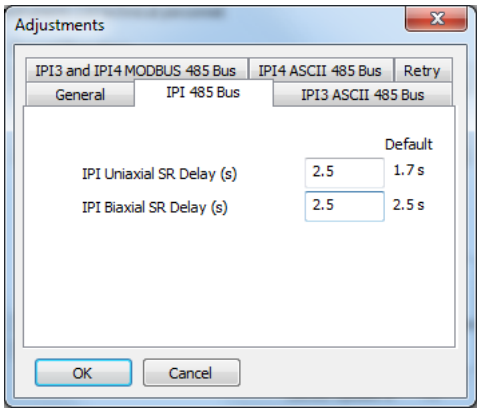


Figure 4-9 – Adjustments – 485 bus DT2485 logger

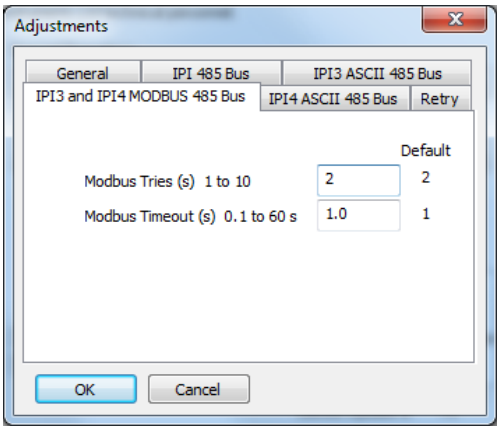


Figure 4-10 – Adjustments – IPI3 and IPI4 Modbus, DT2485 logger

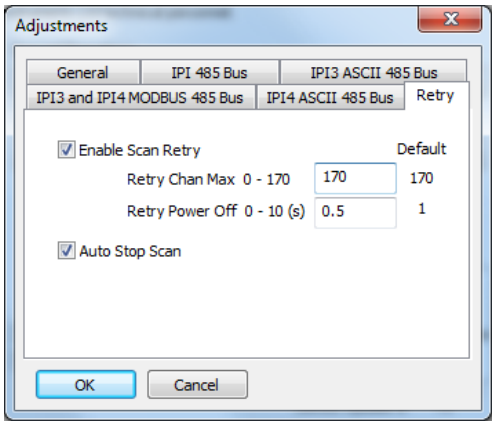


Figure 4-11 – Adjustments – Scan Retry, DT2485 logger

General

Cmd Char Delay USB – delay after each data character in logger to computer USB wired communication.

Cmd Char Delay DT Link – delay after each data character in logger to computer DTLink wireless communication.

DT Link Retry – number of packet retries in wireless DTLink communication, update only value, no current value display.

Delay Before Scan – Delay after power up/wake up, DT2485 and DTSAA loggers only.

Read Top Seg Last – read top DTSAA segment after reading all other segments.

IPI 485 Bus

Delay Before Scan – delay before sensor scan.

RS485 Uniaxial SR delay - delay before sending SR command to uniaxial tilt sensors.

RS485 Biaxial SR delay - delay before sending SR command to biaxial tilt sensors.

IPI3 ASCII 485 Bus, IPI4 ASCII 485 Bus

RS485 Biaxial SR delay - delay before sending SR command to biaxial tilt sensors.

RS485 TR Tries Number – number of TR tries.

RS485 SR Tries Number – number of SR tries.

IPI3 and IPI4 Modbus 485 Bus

Modbus Tries - number of TR tries.

Modbus Timeout.

Scan Retry

Enable Scan Retry – perform another scan after failed sensor read.

Retry Chan Max – Maximum failed channels to be rescanned.

Retry Power Off – length of time sensors will be powered off before scan retry.

Auto Stop Scan – stop scan before taking next record.

5 LOGGER MENU

Once connected to the data logger, the software should automatically establish communication link and display connected status. If this does not occur, verify the port number and communication cable, or refer to Section 9.1 for more help.

The DT Logger Host user interface contains six tabs: *Connections, Status, Monitor, Data View, Logging* and *Sensors*. Each tab option is explained in detail below. Until successful logger connection, all tabs are inaccessible except *Connections, Status and Data View*. A Help button is available in the bottom right corner, which launches the appropriate help files when pressed.

5.1 DT2011B, DT2055, DT2055B, DT2040 VIBRATING WIRE DATA LOGGERS

5.1.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

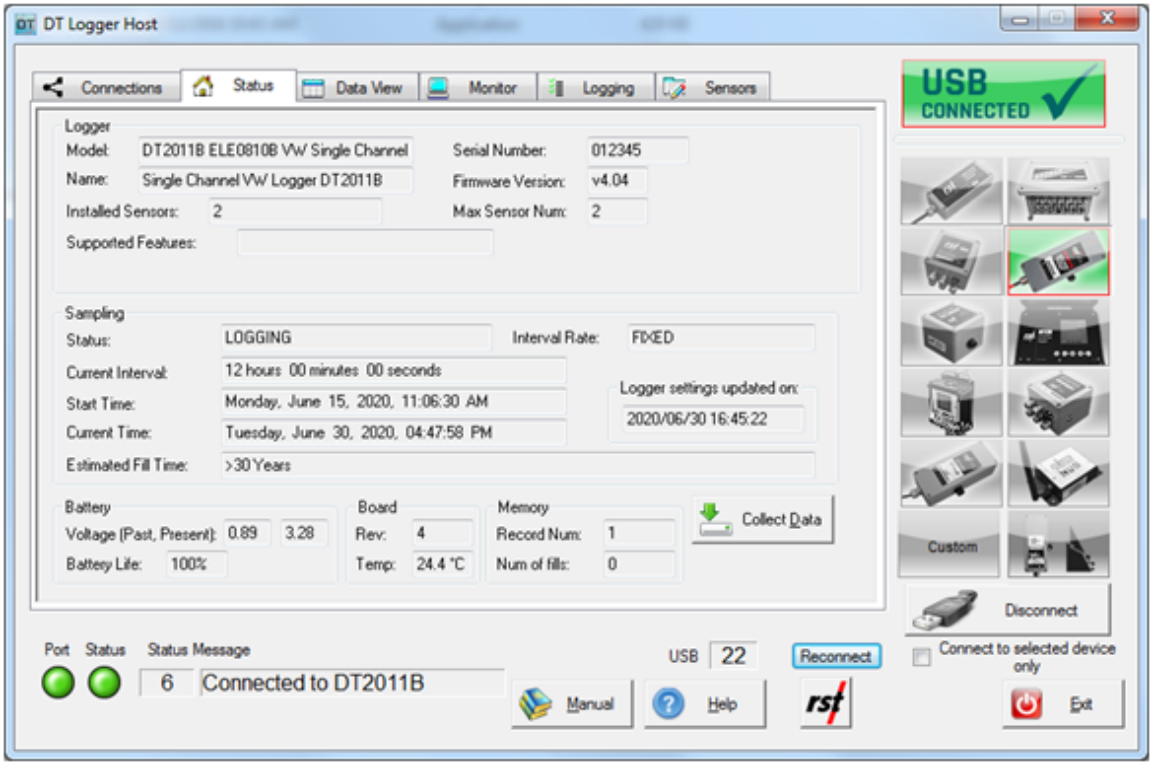


Figure 5-1 – Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, and firmware version. Ensure that the serial number matches what is expected (in this example it is 9925). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established. See Section 5.1.6 for Load Cell Mode instructions.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 battery replacement instructions. RST loggers use special long-life lithium batteries. For more information, please see Section 8.1. Contact RST for replacement part.

Board (USB enabled Loggers only)

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

Memory (USB enabled Loggers only)

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 6.1 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.1.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in B-units (f^2x10^{-3}) or the thermistor temperature in degrees Celsius or Fahrenheit.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

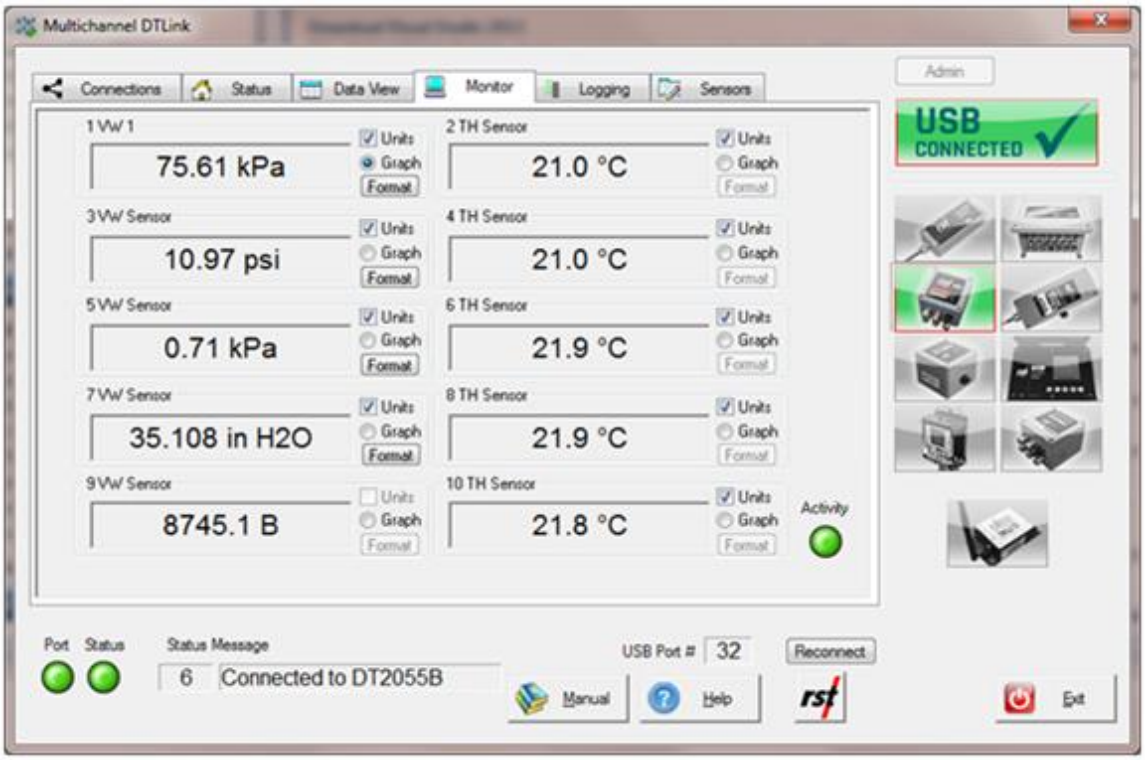


Figure 5-2 – Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”----" in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.1.3 LOAD CELL MONITOR (DT2055 AND DT2040 ONLY)

In Load Cell Mode, Monitor screen will display average values for all sensors grouped into load cell. Refer to Sections 5.1.6 and 5.1.7 for instructions on how to set up load cell mode. By default, the screen reports in B-units (f^2x10^{-3}) or the thermistor temperature in degrees Celsius or Fahrenheit.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

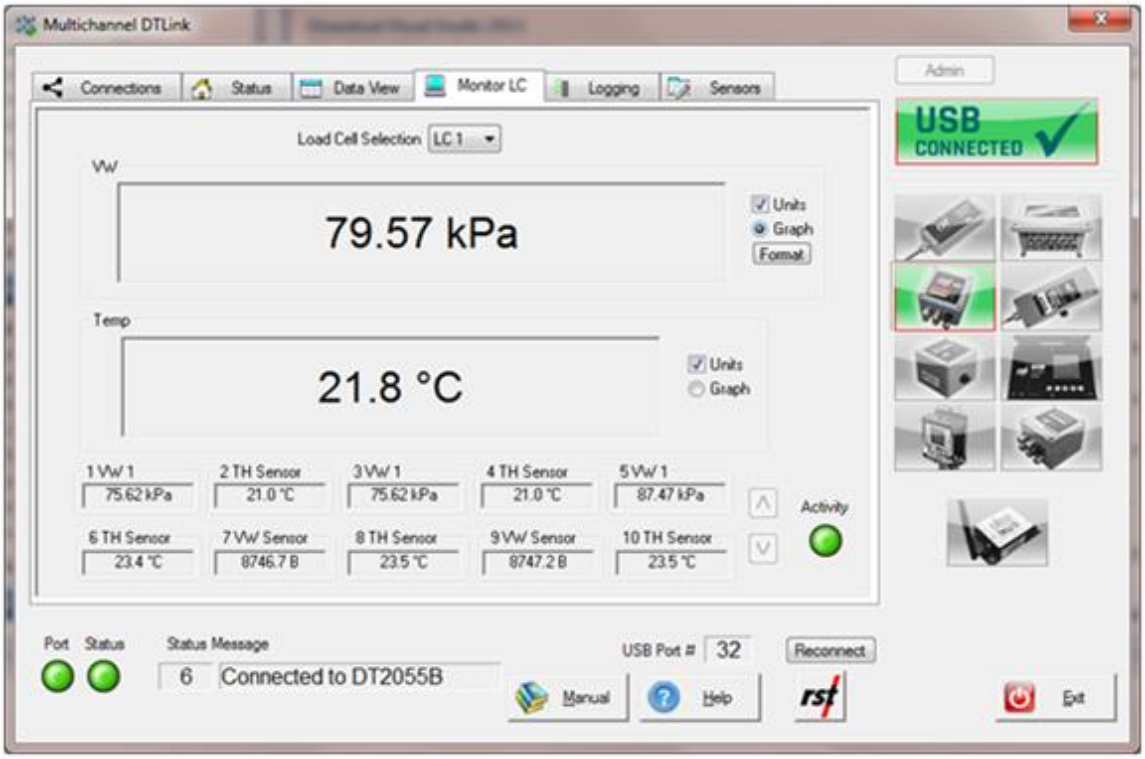


Figure 5-3 – Load cell Monitor tab

The Graphical monitor will display average load cell value.

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.1.4 SELECTIVE MONITOR (PICK MONITOR DT2040 ONLY)

When monitoring DT2040 sensor data, it might be desirable to see several selected sensors only. This can be achieved by activating Pick Monitor. In Connections tab, select Pick Monitor Mode, and then reconnect logger connection.

If successfully connected to the data logger, the sensor reading, and temperature reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units, or thermistor resistance. For Fahrenheit temperature units, check the appropriate box in Connections tab.

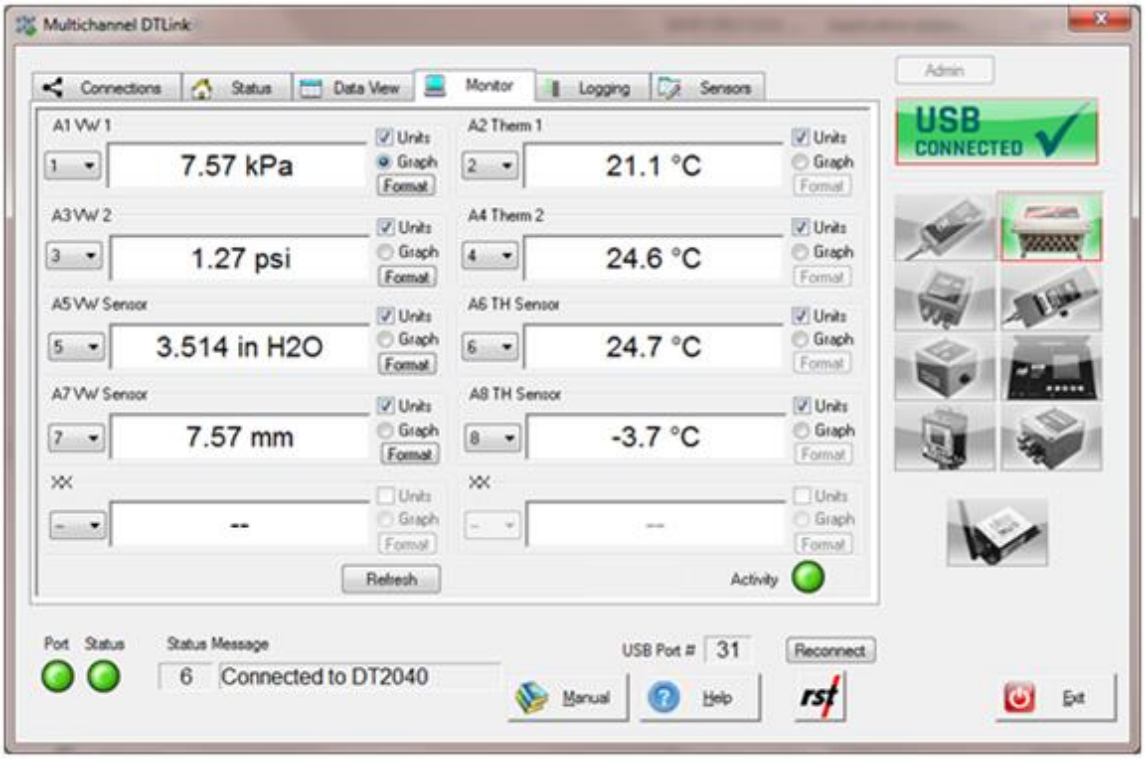


Figure 5-4 – Pick Monitor tab

The Graphical monitor will display average load cell value.

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.1.7 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.1.5 DATA VIEW

The Data View tab allows quick preview of logger data files.

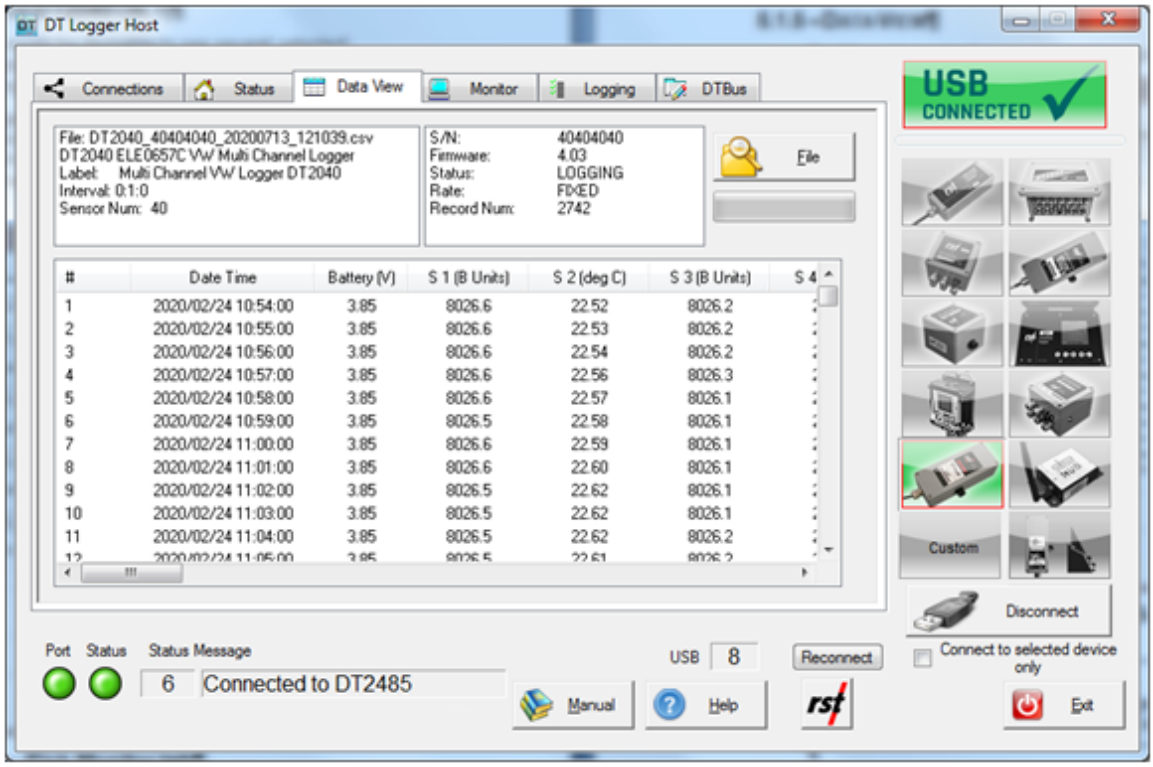


Figure 5-5 – Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.1.6 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

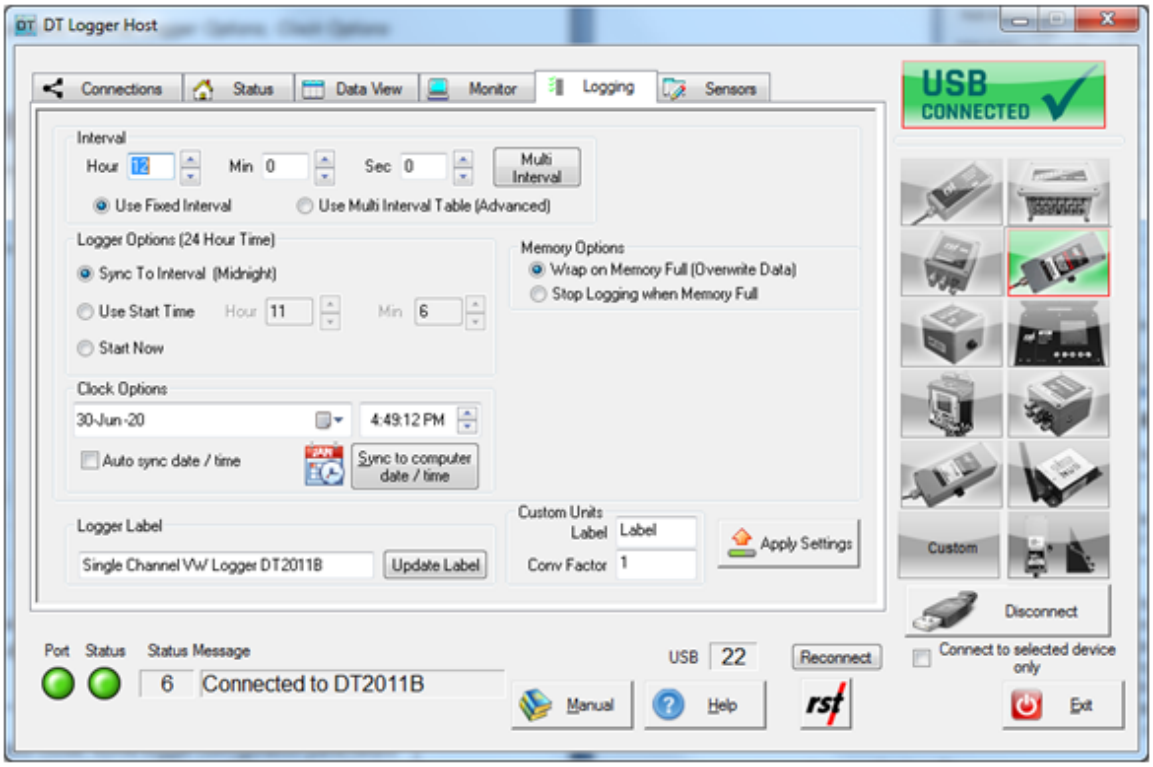


Figure 5-6 – Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

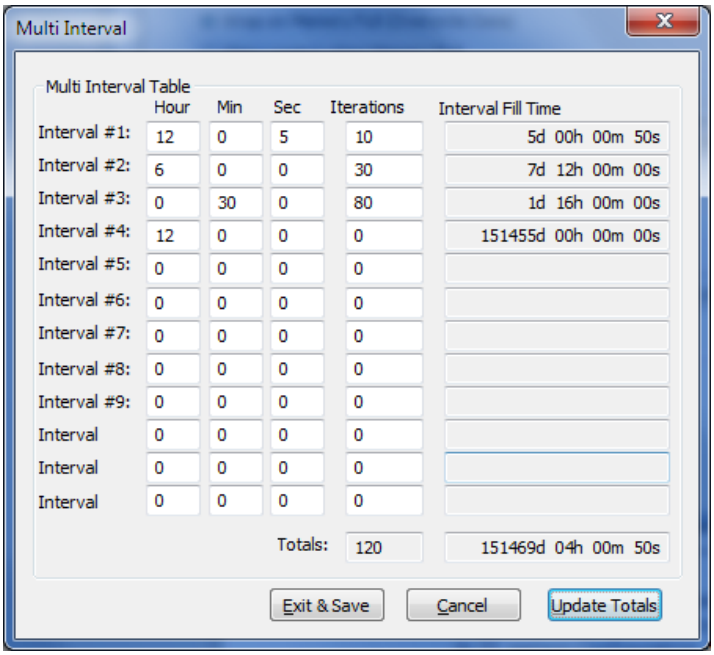


Figure 5-7 – Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configurations. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Sync To Interval: The interval will be verified to ensure data will be taken at midnight.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Load Cell Mode

The load Cell mode can be activated to display average sensor values in Monitor Tab. This setting is useful when all connected sensors are a part of a load cell. Data file download will have average values columns when downloaded in Load Cell mode.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.1.7 SENSORS

The Setup dialog shows current sensor configuration. Sensor types and sensor number can be modified using the following controls:

Add VW, Ins VW (DT2055, DT2055B and DT2040 Loggers only)

To add another vibrating wire sensor to the end of the list, click Add VW button. The screen will change to VW mode. To insert sensor at the current position, click Ins VW.

Add Therm, Ins Therm (DT2055, DT2055B and DT2040 Loggers only)

To add thermistor sensor to the end of the list, click Add Therm button. The screen will show controls for setting up thermal sensor. To insert sensor at the current position, click Ins Therm.

New Copy

When adding subsequent sensors with identical parameters, click New Copy.

Delete Sensors

Used to remove currently displayed sensor from logger configuration. All sensors except first two can be removed as well.

Figure 5-8 – Sensors tab

VW Sensor Type

A drop-down menu allows the user to select from a list of pre-set sweep frequency settings. The software also allows a custom, user defined sweep frequency for use with non-standard vibrating wire sensors. To select this option, choose the “Custom (Advanced)” from the drop-down menu, then click the “Advanced” button. Edit the required fields if necessary and click *Edit Sweep* to determine the remaining parameters.

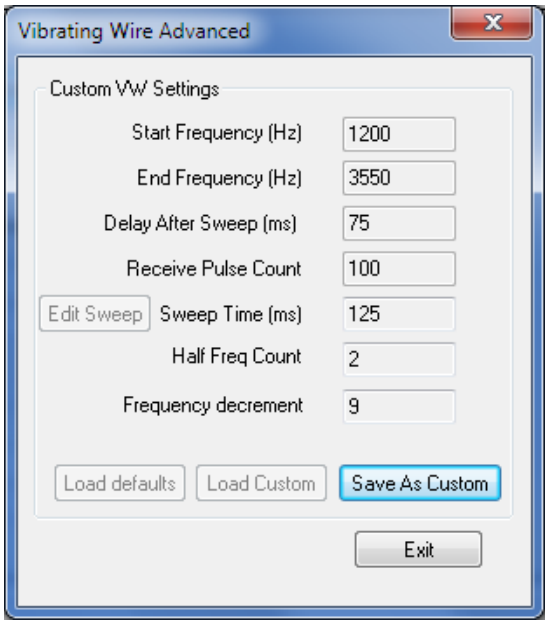


Figure 5-9 – Custom vibrating wire settings

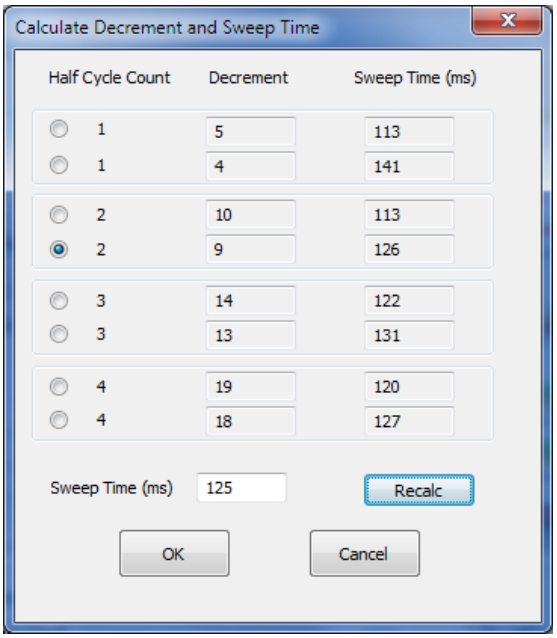


Figure 5-10 – Decrement and Sweep Time options

Enter the desired Sweep Time and click *Recalc.* The program will calculate Decrement and Sweep Time and give option to choose optimal parameters.
Click OK button on both dialogs to write settings to the logger memory.

Often the user may wish to report the readings directly in engineering units, rather than B-units ($f^2 x 10^{-3}$). Data required for the conversion to engineering units is always found on the calibration sheets for the transducer.

Each transducer is shipped from the factory with a calibration sheet. If you have not received a calibration sheet, or the sheet has been lost, please contact RST Instruments and a copy will be faxed or e-mailed to you.

To edit sensor labels, double-click sensor tab and edit label

Conversion Method

The user is given an option to apply either a *Linear* or *Polynomial* Conversion. If *linear conversion* is selected, input the provided Calibration Factor and Zero Reading into the appropriate boxes.
If *polynomial conversion* is selected, input the provided coefficients (A, B & C) into the appropriate boxes.
In each case, equations used for calculations are shown for a reference.

Temperature Correction

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument. Then select thermistor sensor used to read temperature.
If the calibration sheet is missing, please contact RST Instruments and a copy of the calibration sheet can be faxed or e-mailed to you.

Units Conversion

Units Type: Choose pressure, distance, force, strain, VW temp, incline or custom units using the drop-down menu.

Input Units: These are the units of the calibration constants you inputted into either the linear conversion or polynomial conversion methods. In general, the calibration constants reported on the calibration sheets are either in kPa/B unit or psi/B unit. In the case of strain gauges, this could be mm/B unit.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value. Under certain circumstances, the user may wish to enter in the elevation of the pressure transducer. In this way the reported pressure will be correlated to a reference elevation (i.e. above sea level).

Thermal Sensor Type

A drop-down menu allows the user to select the type of thermistor. The following thermistor types can be selected:

- 3K NTC (default)
- 2252 NTC
- 2K RTD
- 5K NTC
- 10K NTC

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File (DT2011B, DT2055, DT2055B and DT2040 Multi Channel Logger only)

Current sensor settings can be saved to a file for later retrieval.

Load from File (DT2011B, DT2055,DT2055B and DT2040 Multi Channel Logger only)

Click this button to load previously saved sensor settings.

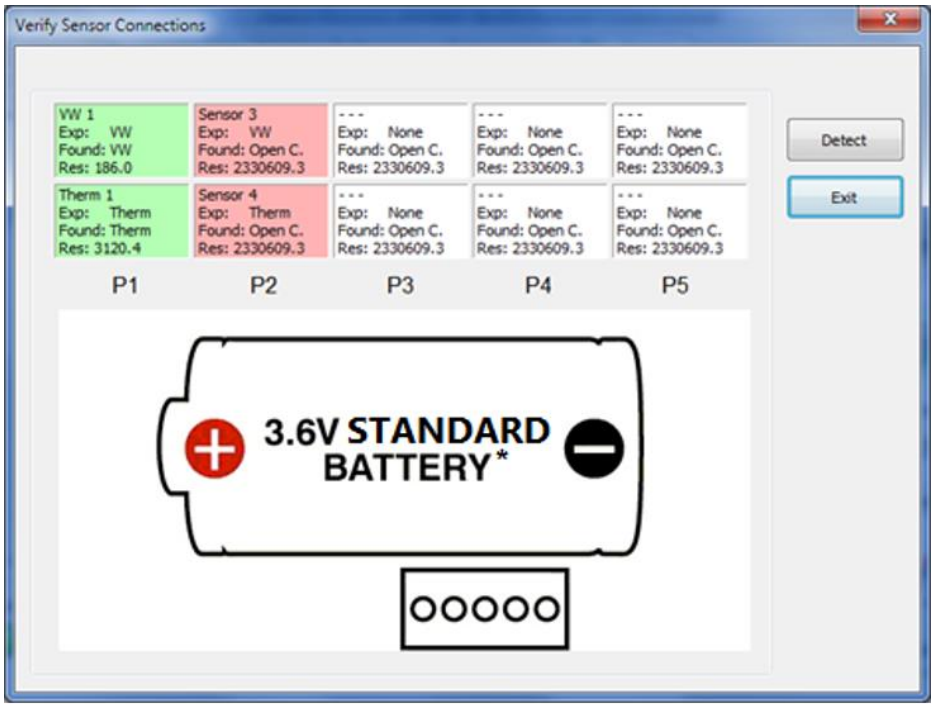
Detect Sensors (DT2055, DT2055B and DT2040 Multi Channel Logger only)

Once sensor configuration is saved and sensors connected, click on *Detect Sensors* to detect, and verify current setup. Each connection is tested and results displayed.
The following parameters are shown:

- Sensor label
- Pre-configured (Expected) sensor type
- Detected sensor type
- Measured sensor resistance in Ohms

When detected sensor parameters appear correct, background color turns green, otherwise background color turns red to indicate error.

The sample screen is shown on Figure 5-11.



*See Section 8 for more information about batteries

Figure 5-11 – Verify VW and temp sensor connections

5.2 DT4205 4 TO 20MA LOGGER

5.2.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

Figure 5-12 – 4 to 20mA Logger Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 05018). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 DT4205 battery replacement instructions. The DT4205 logger uses special long-life lithium batteries. Please see 8.1 for more information and contact RST for replacement part.

Board

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 6.2 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.2.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in mA of the detected current.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

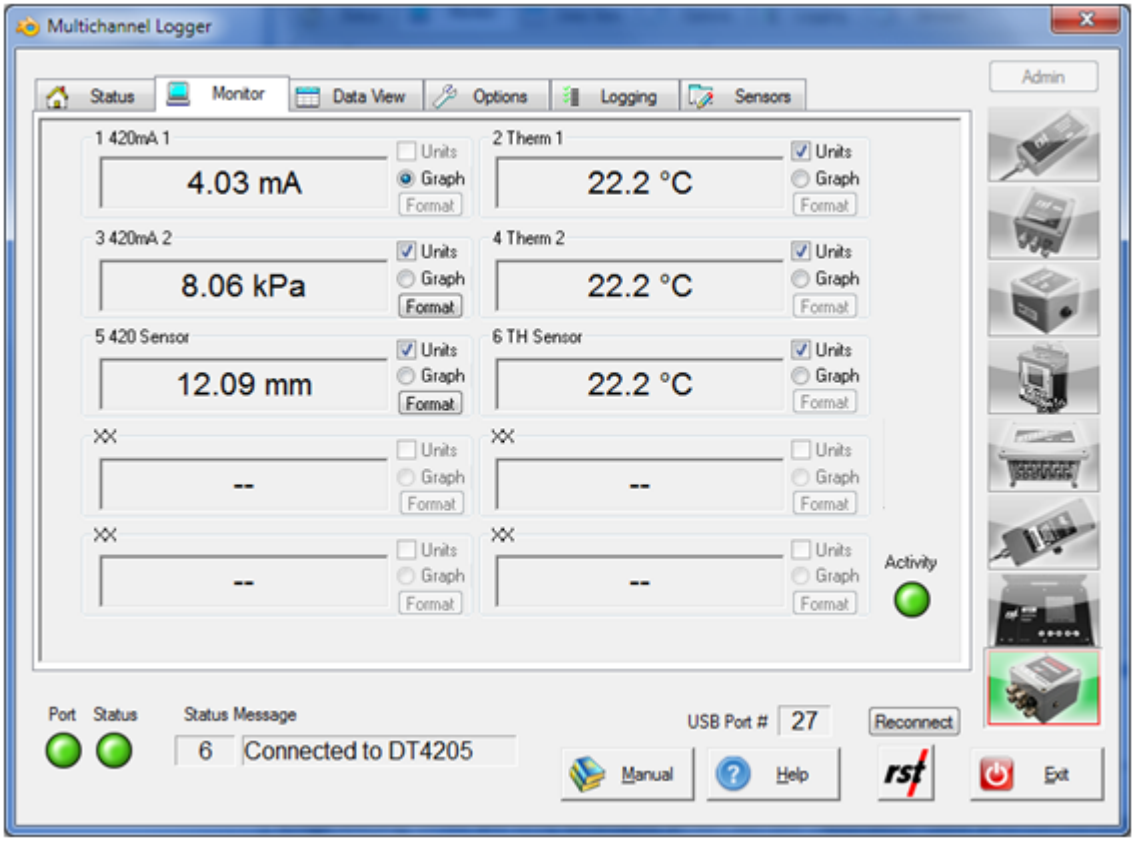


Figure 5-13 – 4 to 20mA Logger Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.2.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.2.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

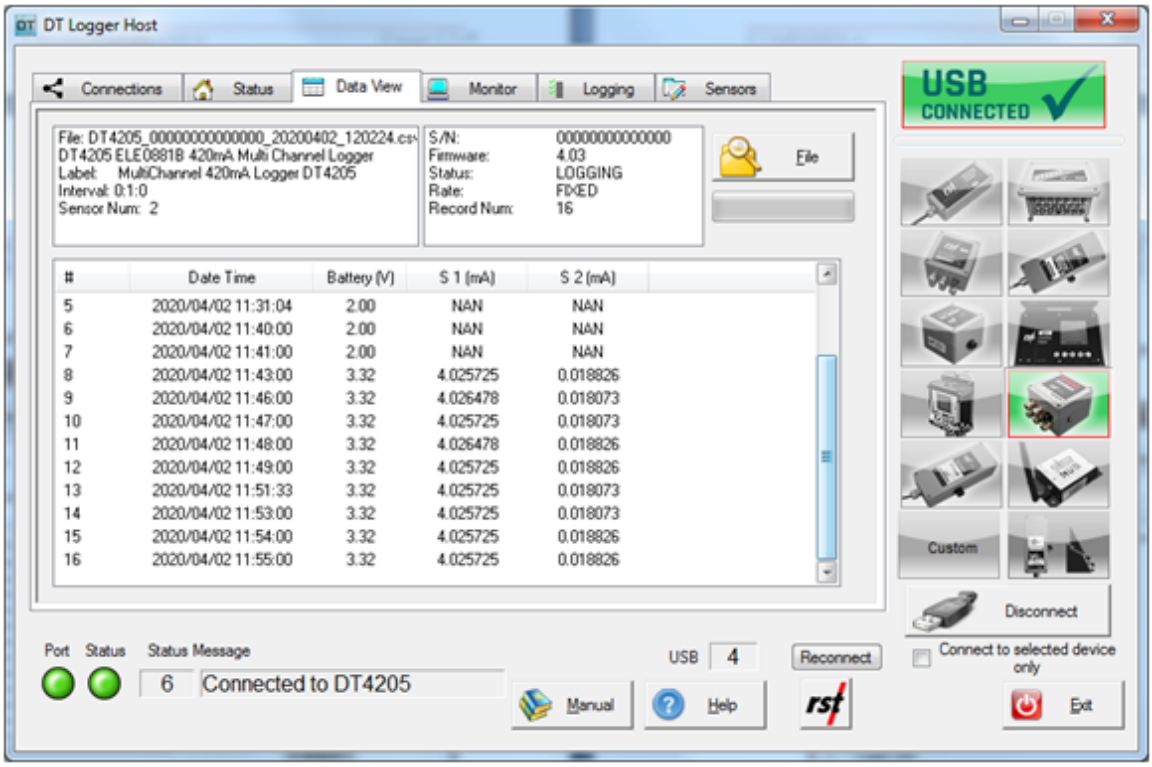


Figure 5-14 – 4 to 20mA Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.2.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

Figure 5-15 – 4 to 20mA Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

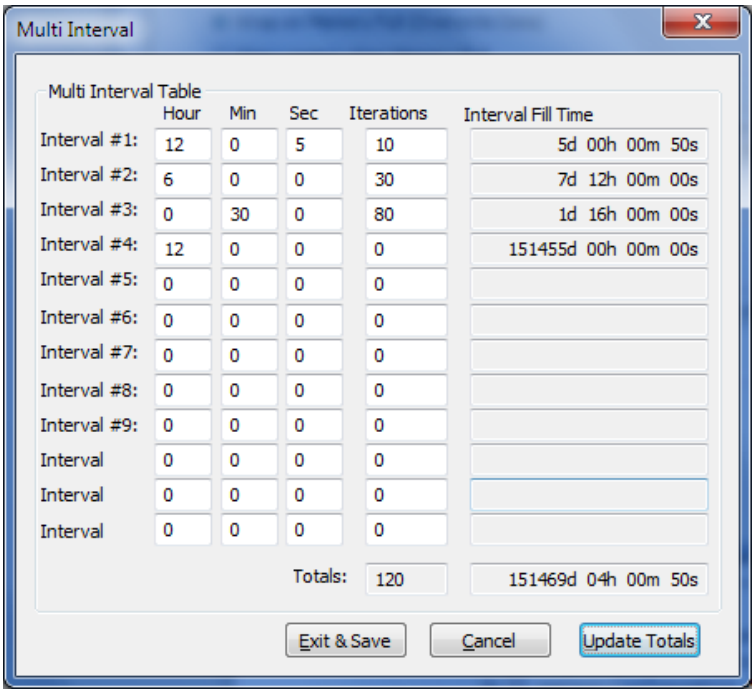


Figure 5-16 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configurations. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.2.5 SENSORS

The Setup dialog shows current sensor configuration. Sensor types and sensor number can be modified using the following controls:

Add 420, Ins 420

To add another 420 sensor to the end of the list, click Add 420 button. The screen will change to 420 mode. To insert sensor at the current position, click Ins 420.

Add Therm, Ins Therm

To add thermistor sensor to the end of the list, click Add Therm button. The screen will show controls for setting up thermal sensor. To insert sensor at the current position, click Ins Therm.

New Copy

When adding subsequent sensors with identical parameters, click New Copy.

Delete Sensors

Used to remove currently displayed sensor from logger configuration. All sensors except first two can be removed as well.

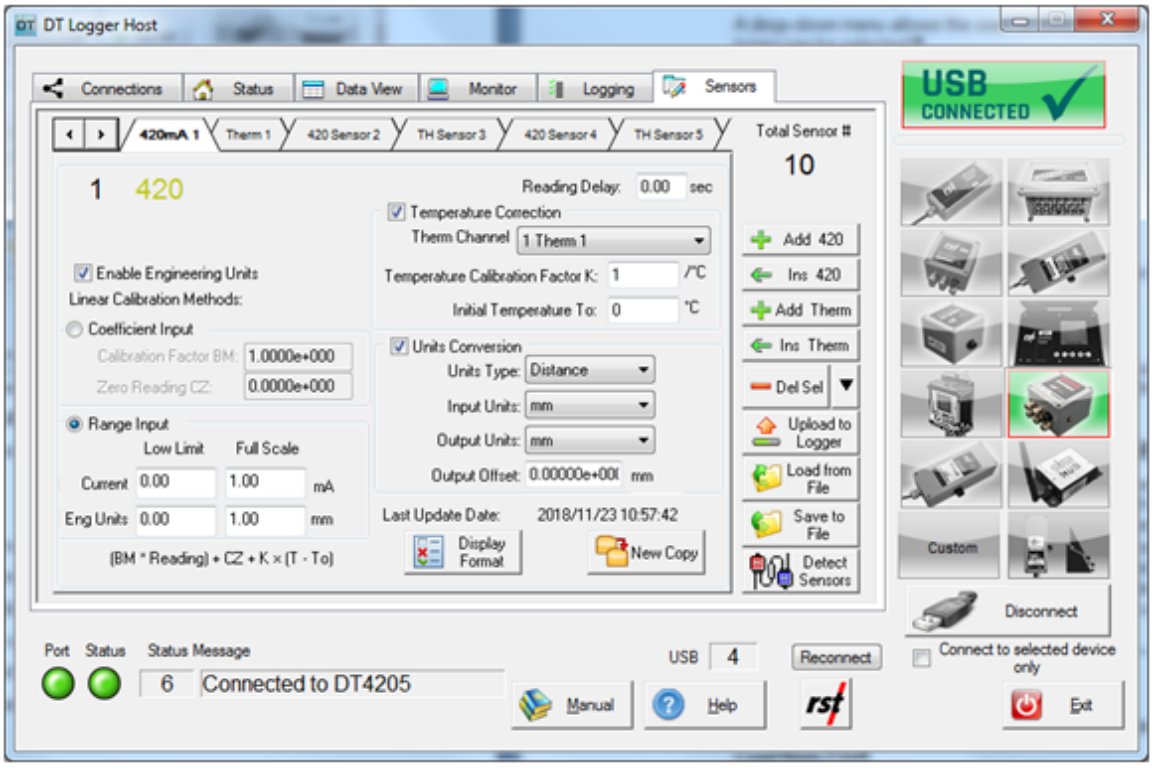


Figure 5-17 – 4 to 20mA Logger Sensors tab

To edit sensor labels, double-click sensor tab and edit label.

Often the user may wish to report the readings directly in engineering units, rather than mA.

Conversion Method

Engineering values are calculated using linear conversion.

The user is given two options to apply a Linear Conversion:

- Coefficient Input. Enter Calibration Factor BM and Zero Reading CZ.
- Range Input. Input current and engineering calibration limits into appropriate boxes.

The option is also given to modify the sensor offset.

Equation used for calculations is shown for a reference.

Temperature Correction

When the Enable Temperature Correction box is checked, the software will apply a temperature correction to the data. This requires the user to enter in the temperature correction factor and an initial temperature which is found on the calibration sheet for that particular instrument. Then select thermistor sensor used to read temperature.
If the calibration sheet is missing, please contact RST Instruments and a copy of the calibration sheet can be faxed or e-mailed to you.

Units Conversion

Units Type: Choose pressure, distance, force, strain, VW temp, incline or custom units using the drop-down menu.

Input Units: These are the units of the calibration constants you inputted into either the coefficient or range conversion methods.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

Thermal Sensor Type

A drop-down menu allows the user to select the type of thermistor. The following thermistor types can be selected:

- 3K NTC (default)
- 2252 NTC
- 2K RTD
- 5K NTC
- 10K NTC

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by clicking on ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

Detect Sensors

Once sensor configuration is saved and sensors connected, click on *Detect Sensors* to detect, and verify current setup. Each connection is tested and results displayed.
The following parameters are shown:

- Sensor label
- Pre-configured (Expected) sensor type
- Detected sensor type

- Measured sensor resistance in Ohms

When detected sensor parameters appear correct, background color turns green; otherwise background color turns red to indicate error.

The sample screen is shown on Figure 5-18.

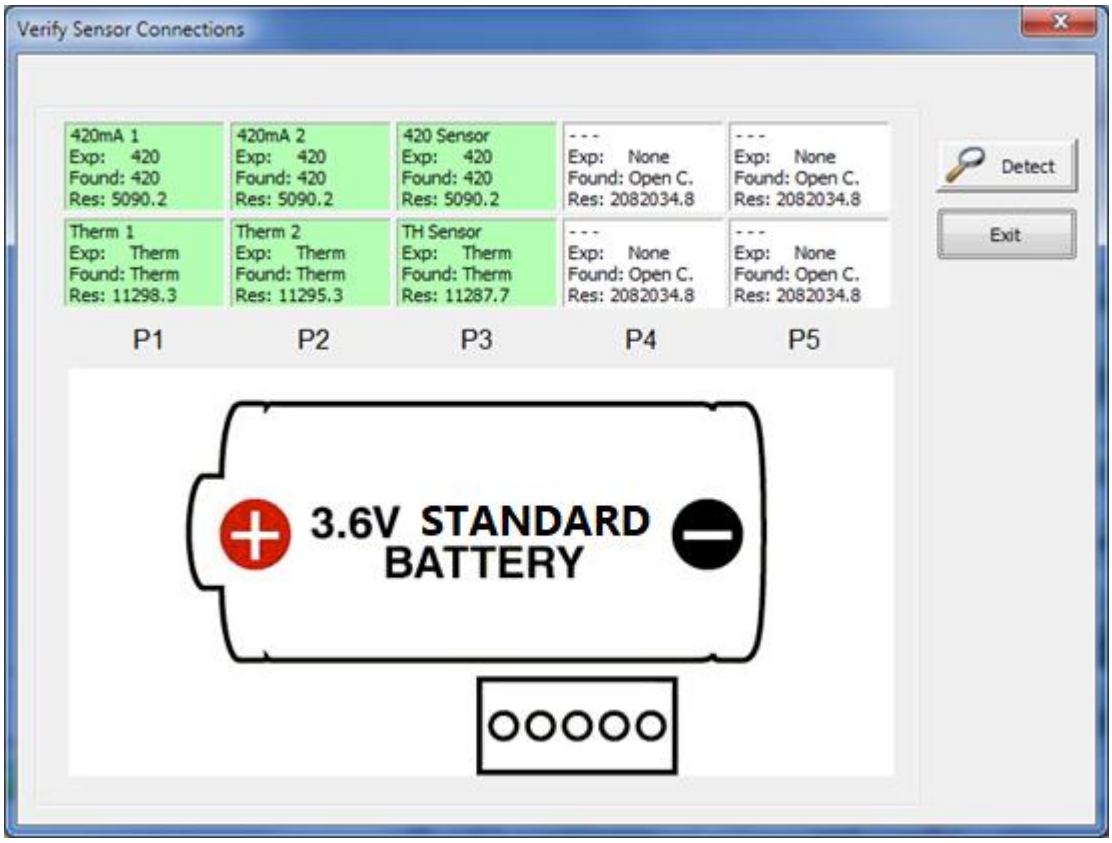


Figure 5-18 – Verify 420 and temp sensor connections

5.3 IC6560, IC6660, DTL201B AND DTL202B TILT LOGGERS

5.3.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

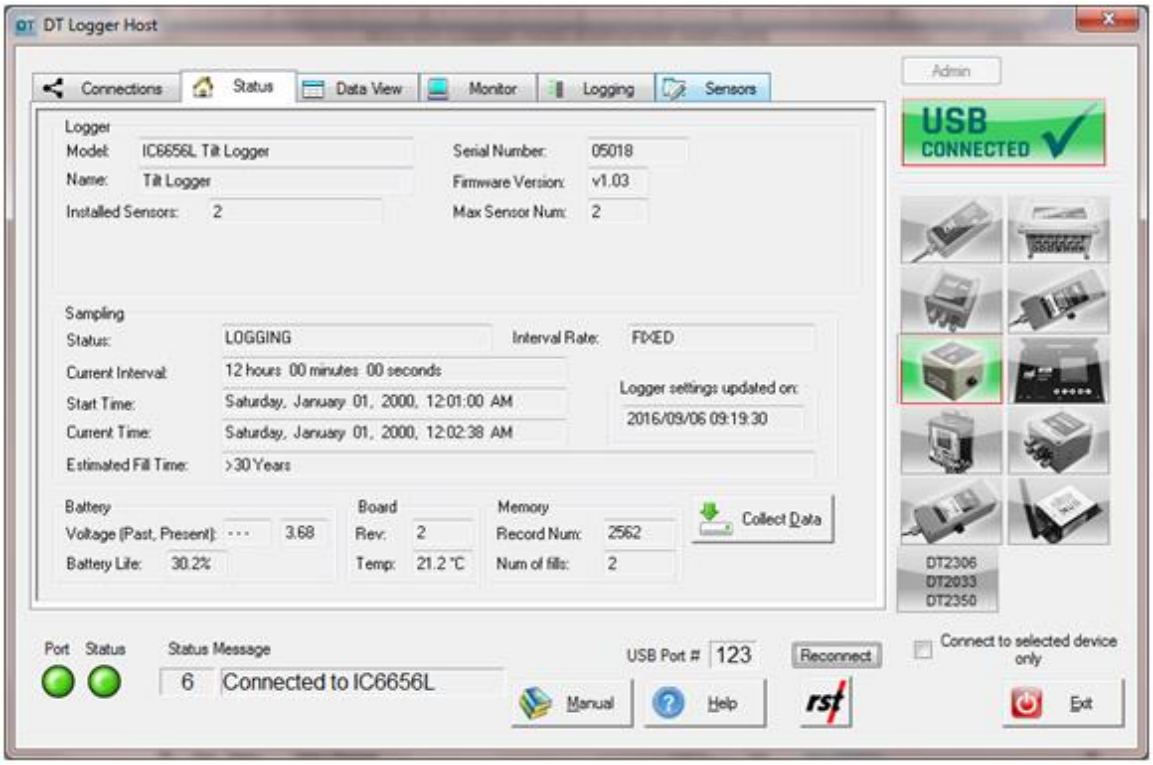


Figure 5-19 – Tilt Logger Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 05018). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace batteries when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The "Battery Past" value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8.4 for Tilt Logger battery replacement instructions. The Tilt Logger uses special long-life lithium batteries. Please see Section 8.1 for more information and contact RST for replacement parts.

Board

Board revision level is helpful for diagnostic purposes. Actual board temperature is shown.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 6.3 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.3.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in sine of the detected inclination.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

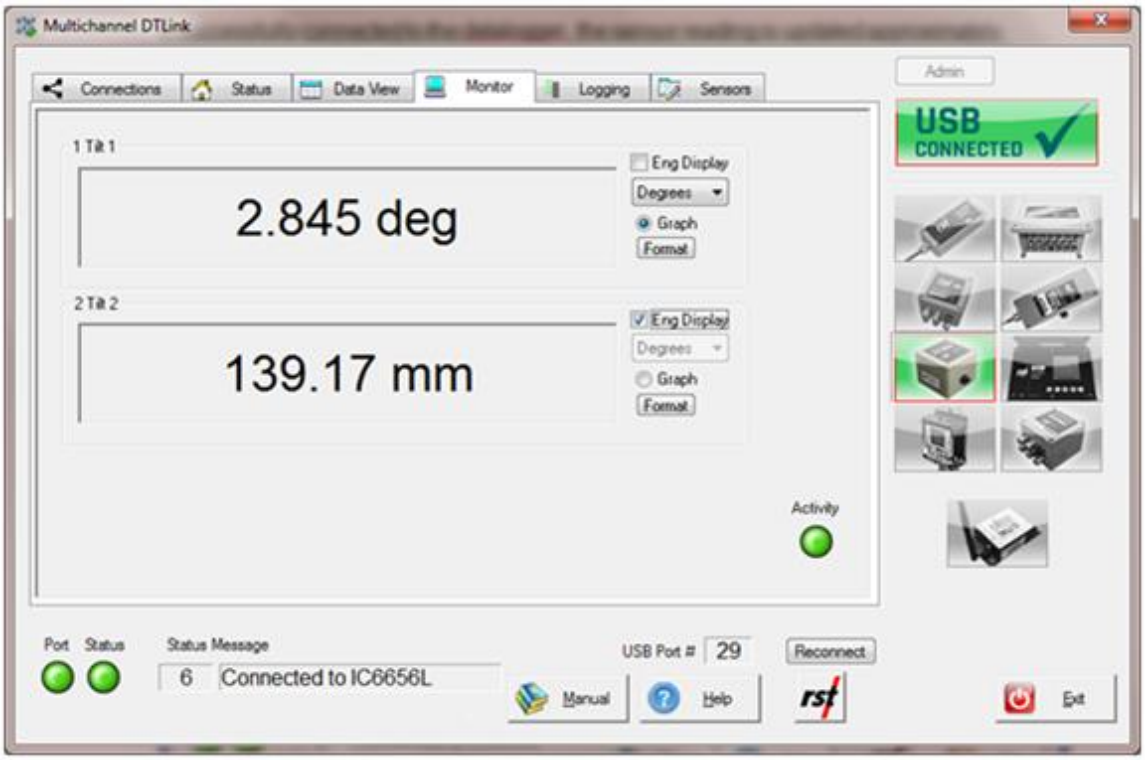


Figure 5-20 – Tilt Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.2.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.3.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

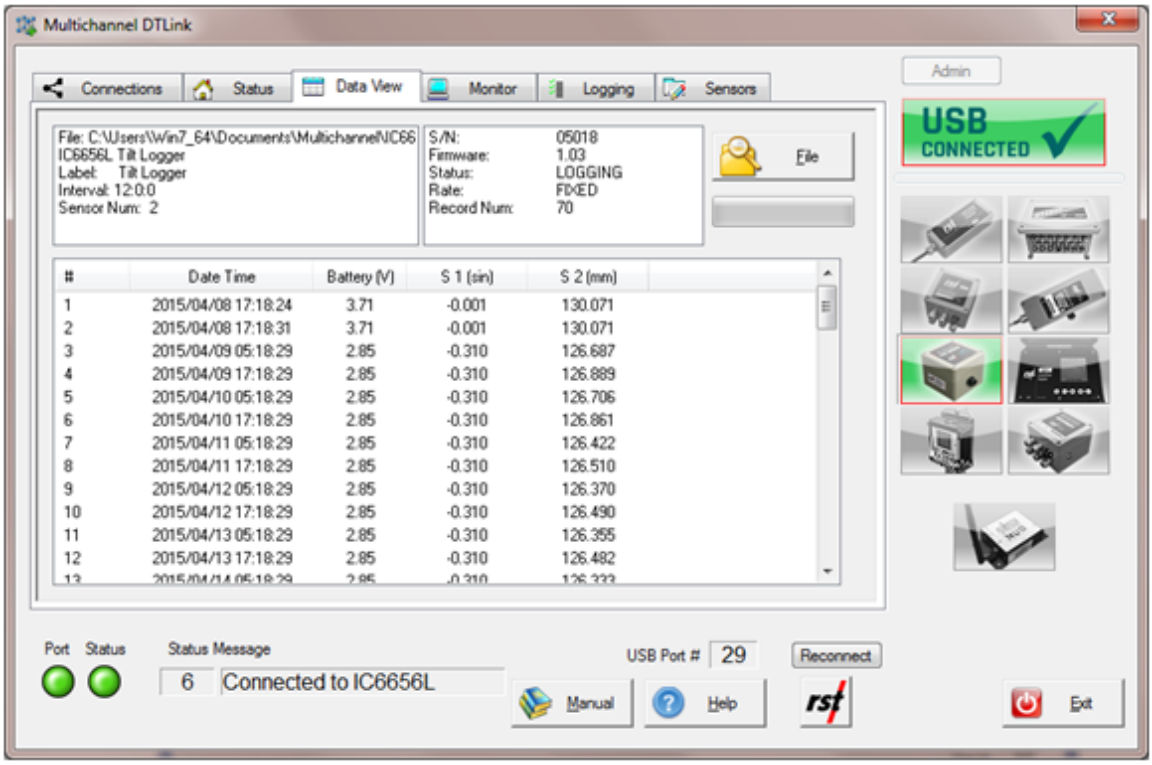


Figure 5-21 – Tilt Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.3.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

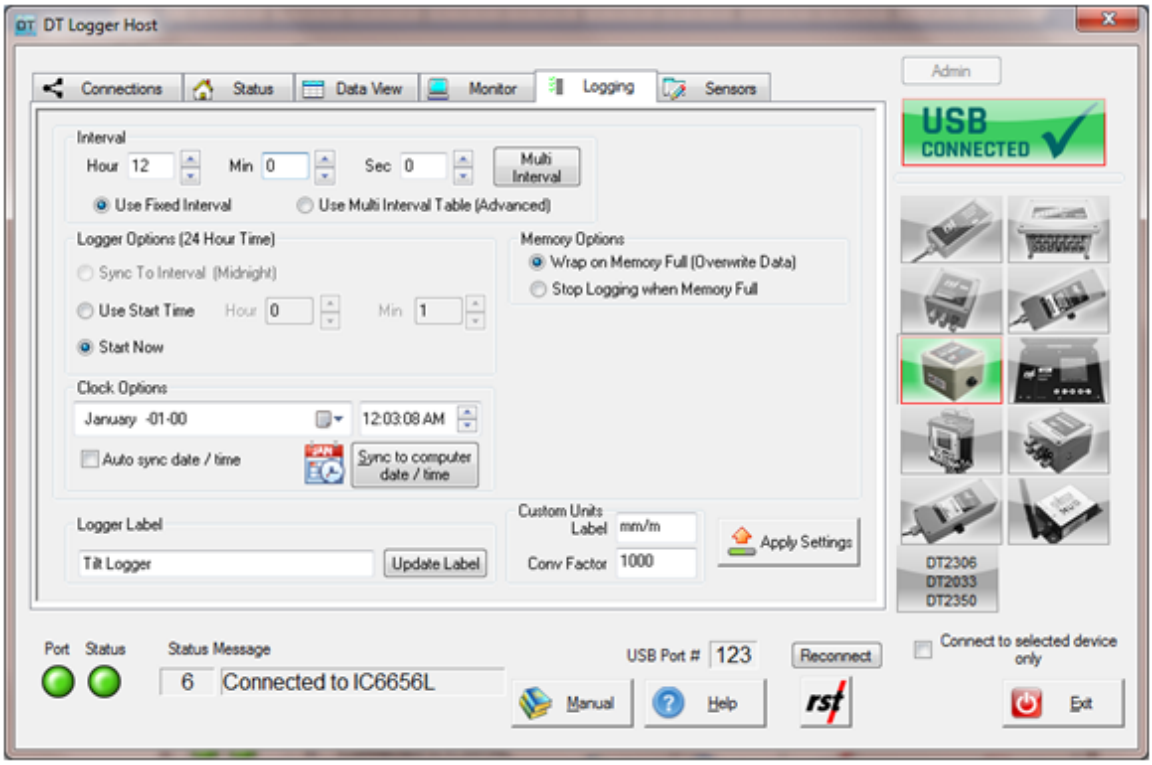


Figure 5-22 – Tilt Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

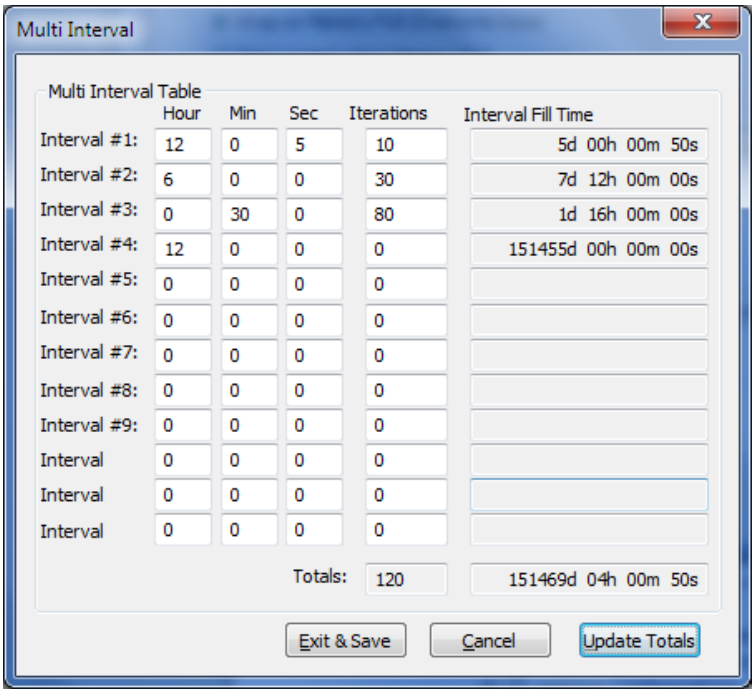


Figure 5-23 – Multi Interval Table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the*

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.3.5 SENSORS

Tilt sensors come in two hardware configurations: uniaxial and biaxial. The second B sensor can be enabled or disabled in biaxial units. Use Copy to B to quickly transfer settings from A sensor.

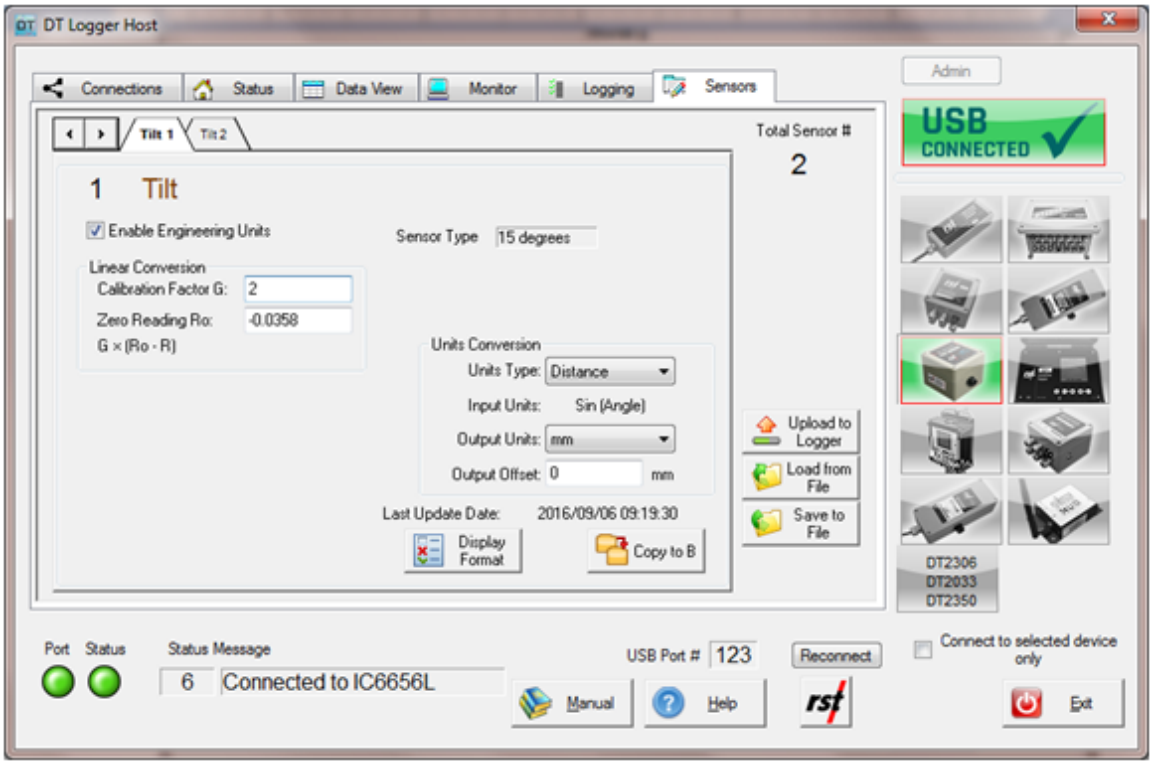


Figure 5-24 – Tilt Logger Sensors tab

Often the user may wish to report the readings directly in engineering units, rather than sin(angle)

Conversion Method

The user is given an option to apply *Linear* Conversion. Input the provided Calibration Factor and Zero Reading into the appropriate boxes.

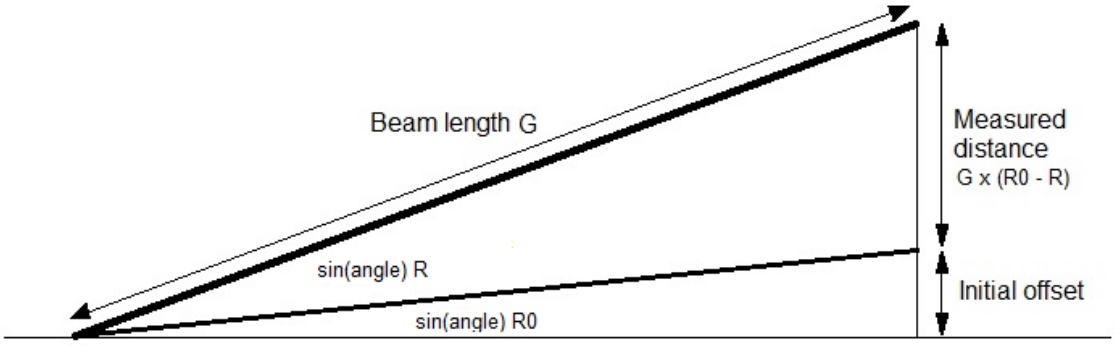


Figure 5-25 – Tilt Distance Calibration

Units Conversion

*Units Type: Currently o*nly distance and incline conversion is available.

Input Units: Currently set to sin(angle).

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Copy to B

Used for adding subsequent sensors with identical parameters

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

5.4 DT2306 POTENTIOMETER LOGGER

5.4.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

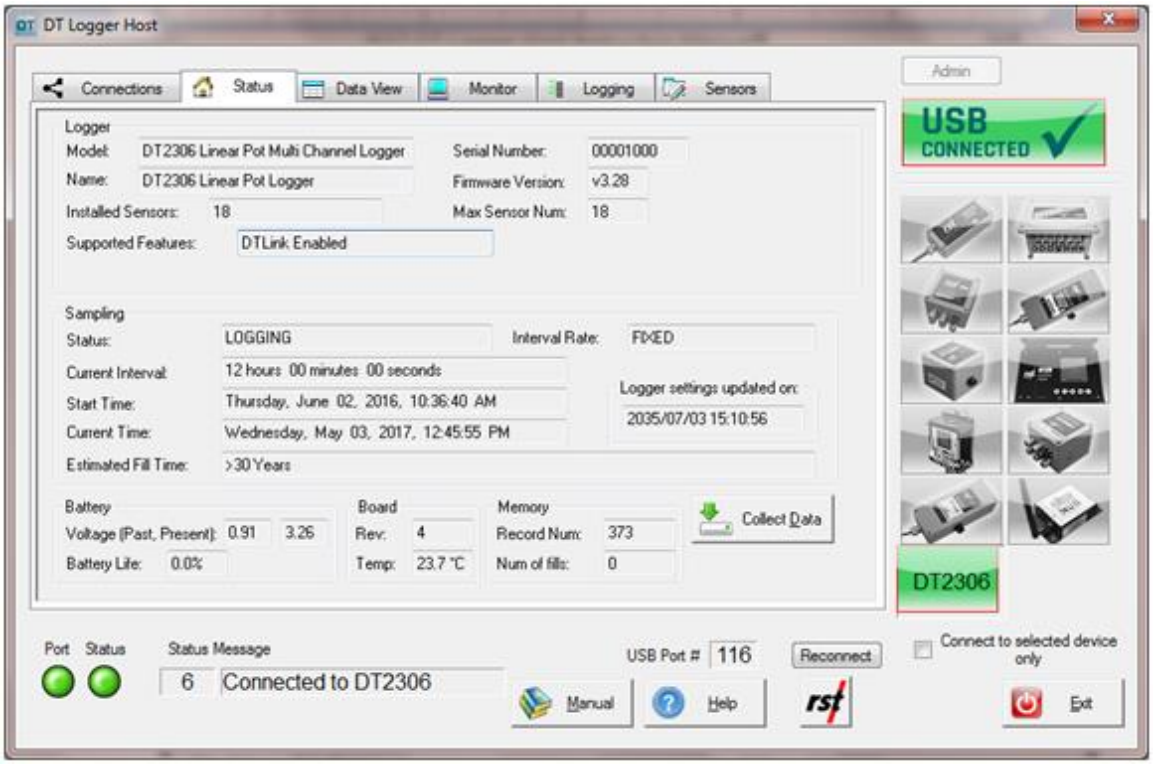


Figure 5-26 – DT2306 Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 01002). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The DT2306 Logger uses special long-life lithium batteries; contact RST for replacement part.

Board

Board revision level is helpful for diagnostic purposes.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 0 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.4.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

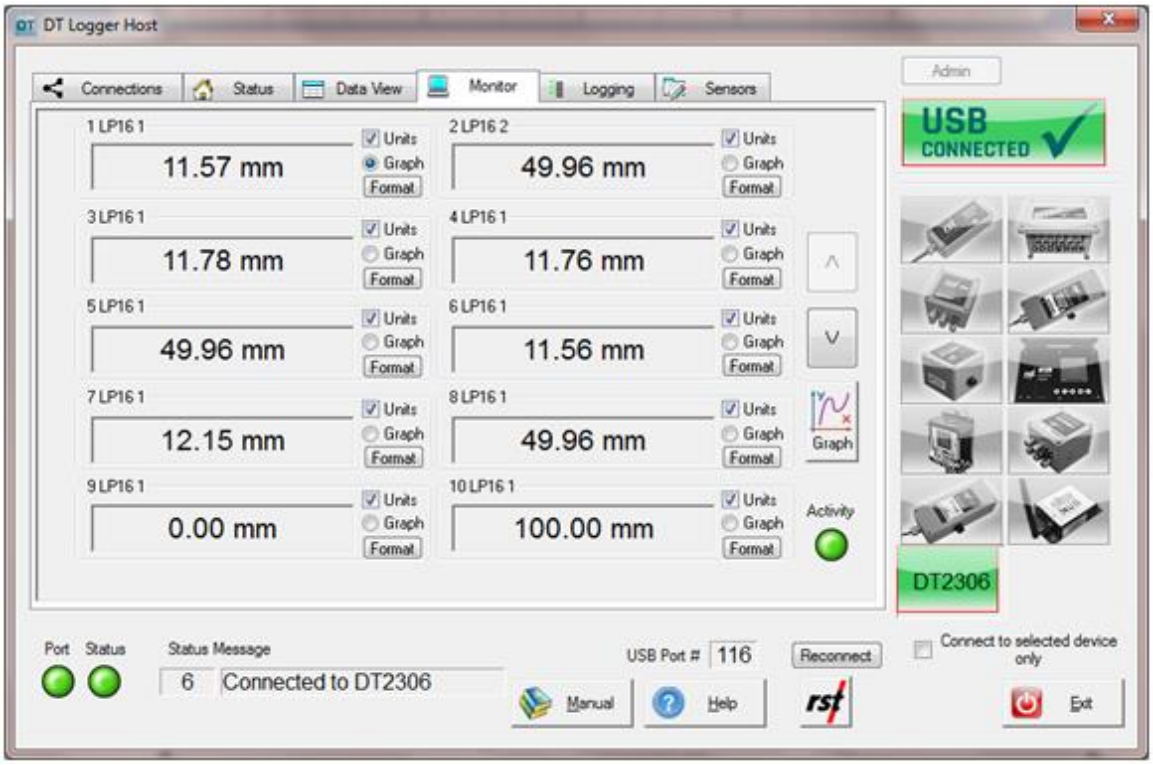


Figure 5-27 – DT2306 Logger Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.4.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.4.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

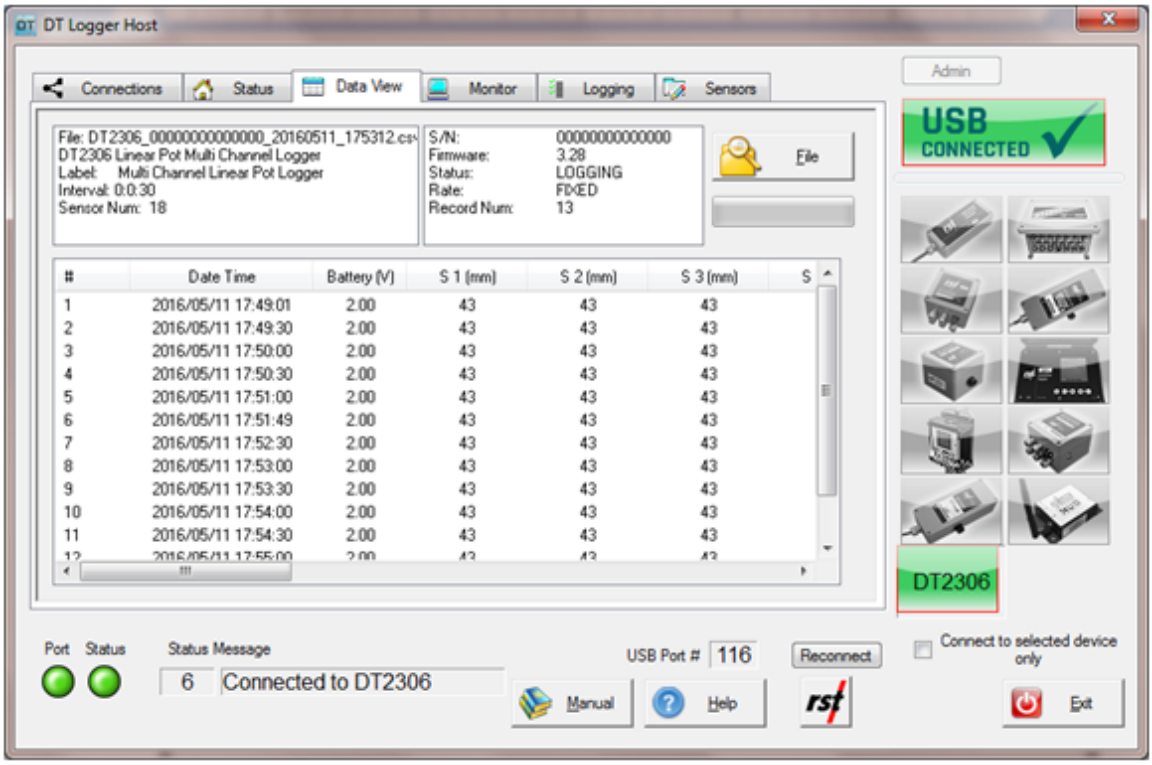


Figure 5-28 – DT2306 Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.4.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

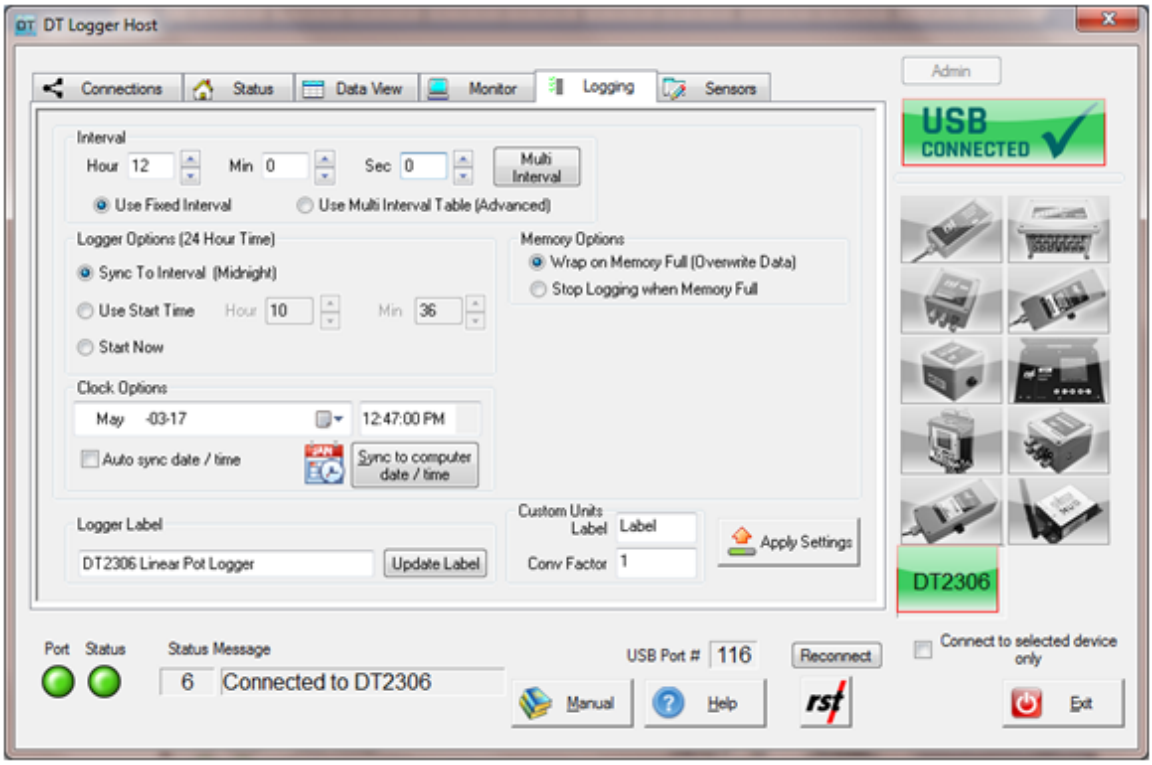


Figure 5-29 – DT2306 Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

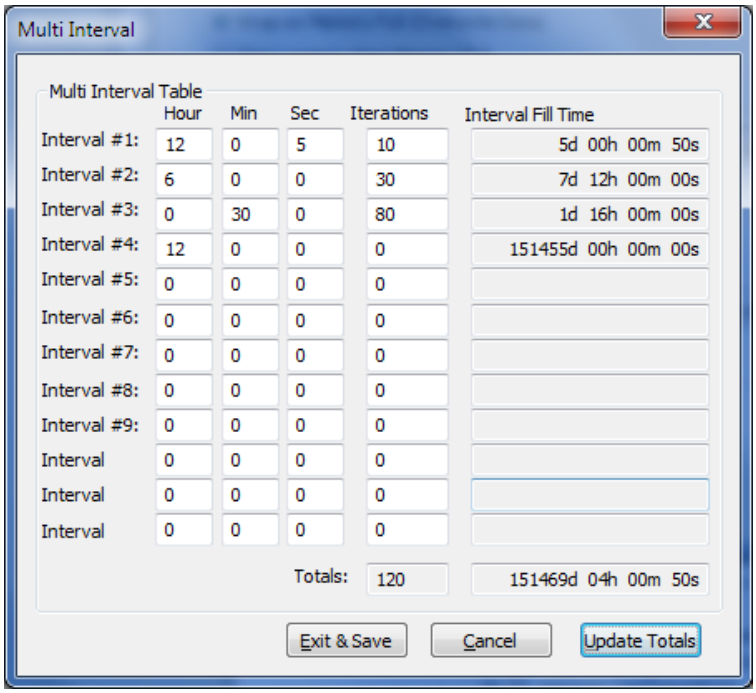


Figure 5-30 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.4.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.

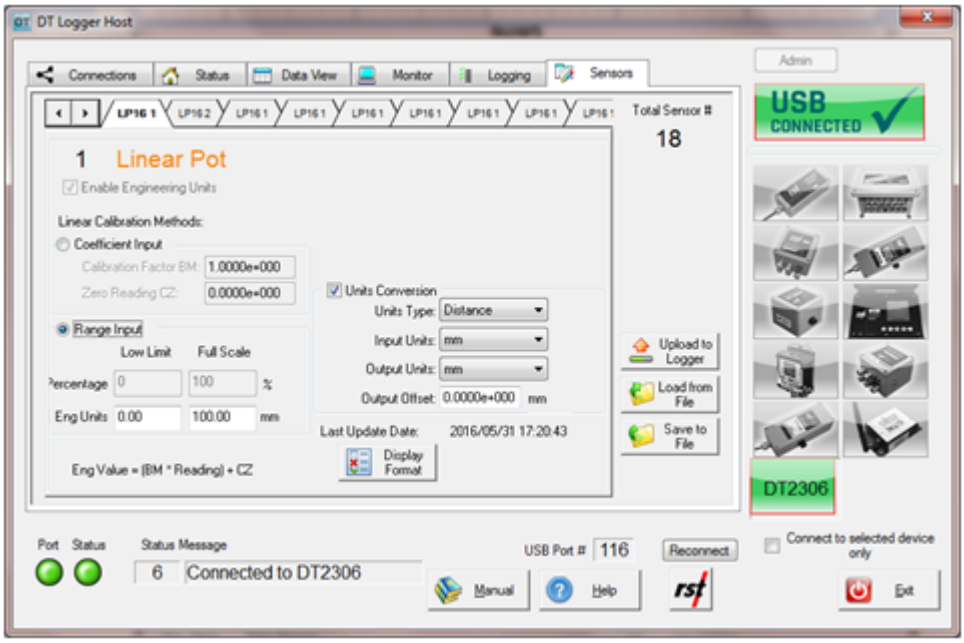


Figure 5-31 – DT2306 Logger Sensors tab

Often the user may wish to report the readings directly in engineering units, rather than in percentage.

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

5.5 DT2485, DT2033 DT-BUS LOGGERS

5.5.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

Figure 5-32 – DT-BUS Logger Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 50353). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The DT2485 Logger uses special long-life lithium batteries; contact RST for replacements.

Board

Board revision level is helpful for diagnostic purposes.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 6.4 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.5.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in sine.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated.
Clicking the check boxes changes the display to Engineering Units.
There are two modes of monitor display: Select Mode and List Mode. Mode switching is available in Logger Options (Section 4.4).

5.5.2.a SELECT MONITOR MODE

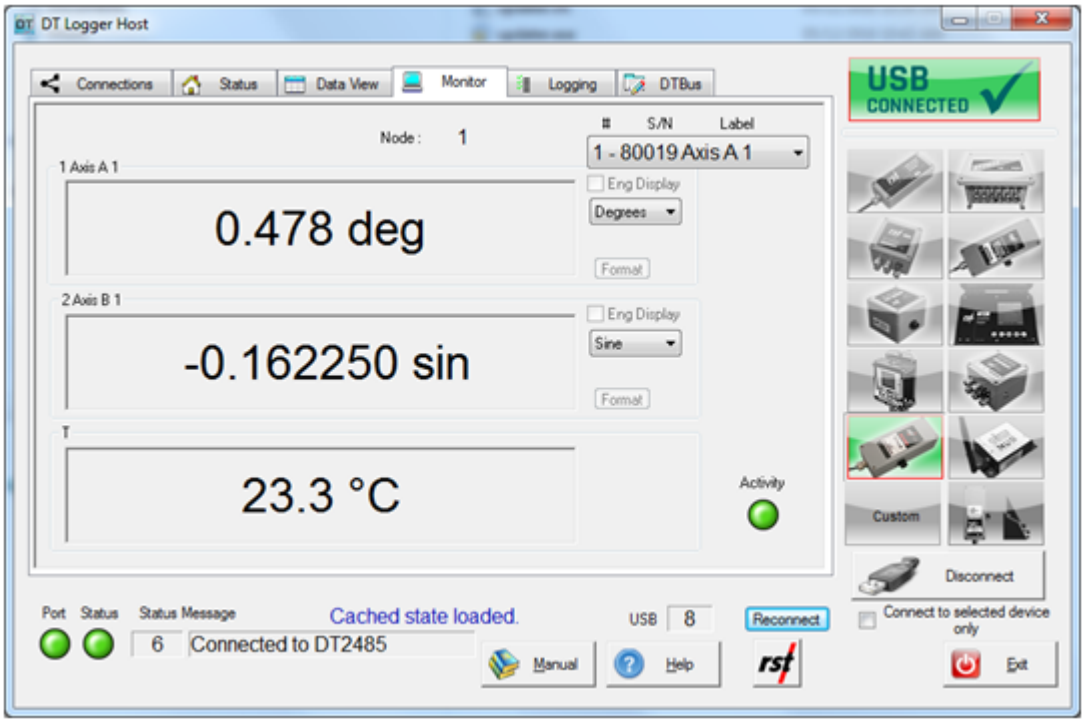


Figure 5-33 – DT-BUS Logger Monitor tab – Select Mode

5.5.2.b LIST MONITOR MODE

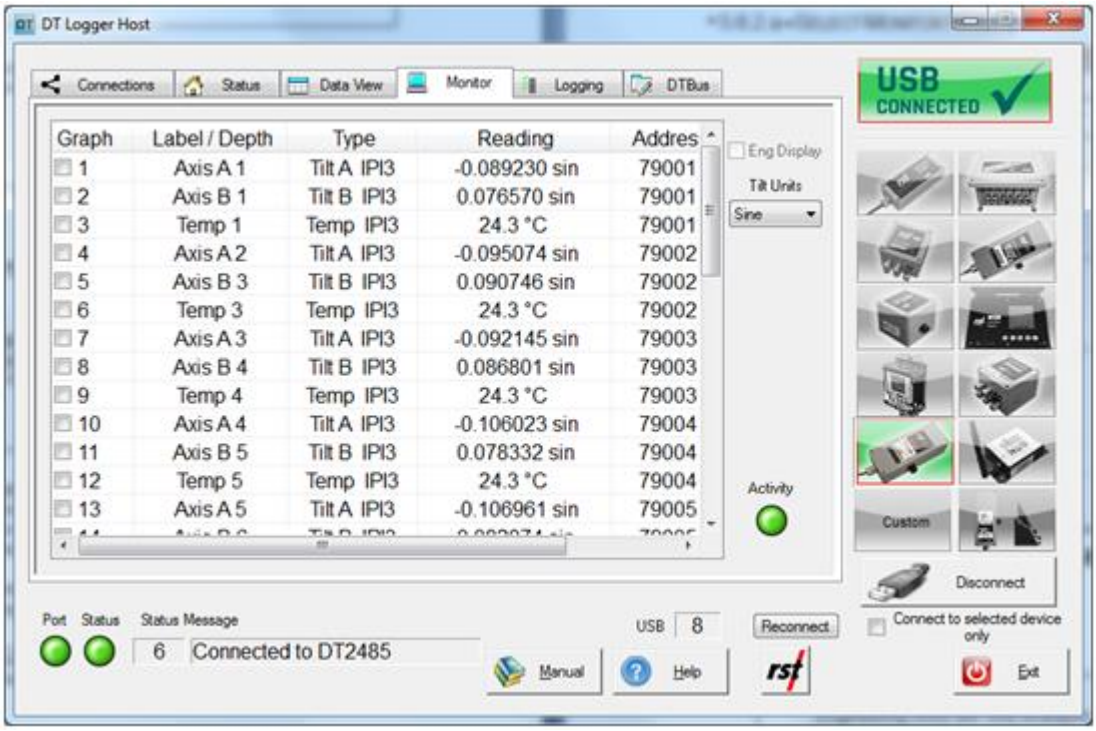


Figure 5-34 – DT-BUS Logger Monitor tab – List Mode

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.5.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.5.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

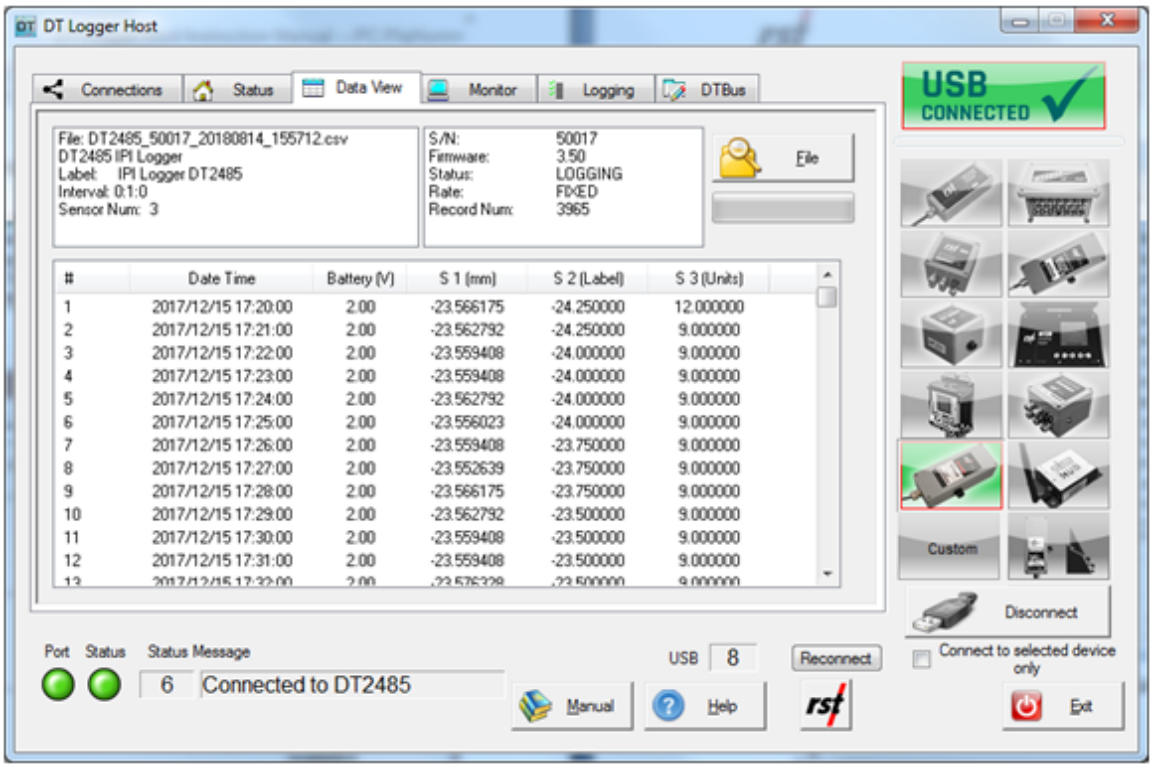


Figure 5-35 – DT-BUS Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.5.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

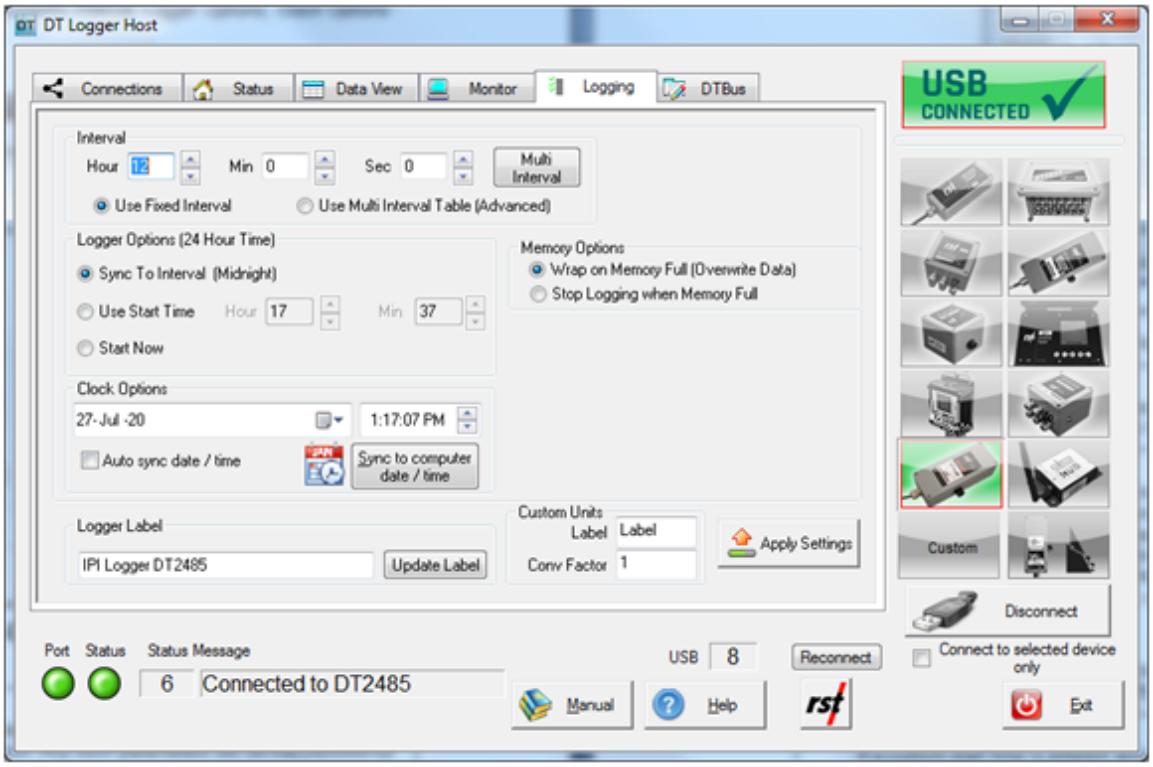


Figure 5-36 – DT-BUS Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

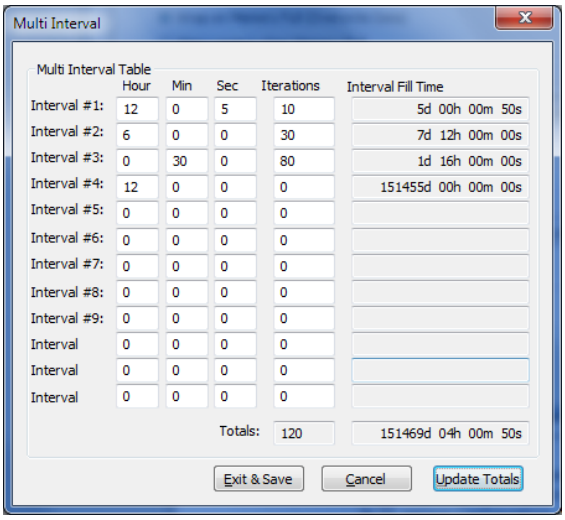


Figure 5-37 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 250,000 records with one biaxial sensor connected, and 8,000 records in 85 sensor configuration. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.5.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.
DT-BUS logger supports two sensor types:

- DT-BUS sensors, currently RST Tilt IPI, IPI3, IPI4, RST Tiltmeter, RST Thermarray and RST Precision Liquid Settlement Array (PLSA).
- Modbus sensors, integer, and float types
- **Beaded**stream temperature array

Both DT-BUS and Modbus type sensors can coexist on the same RS485 bus, except for RST Tilt IPI4 sensor.
Beadedstream temperature array and PLSA cannot coexist with any other sensor types.

5.5.5.a DT-BUS SENSORS CONFIGURATION

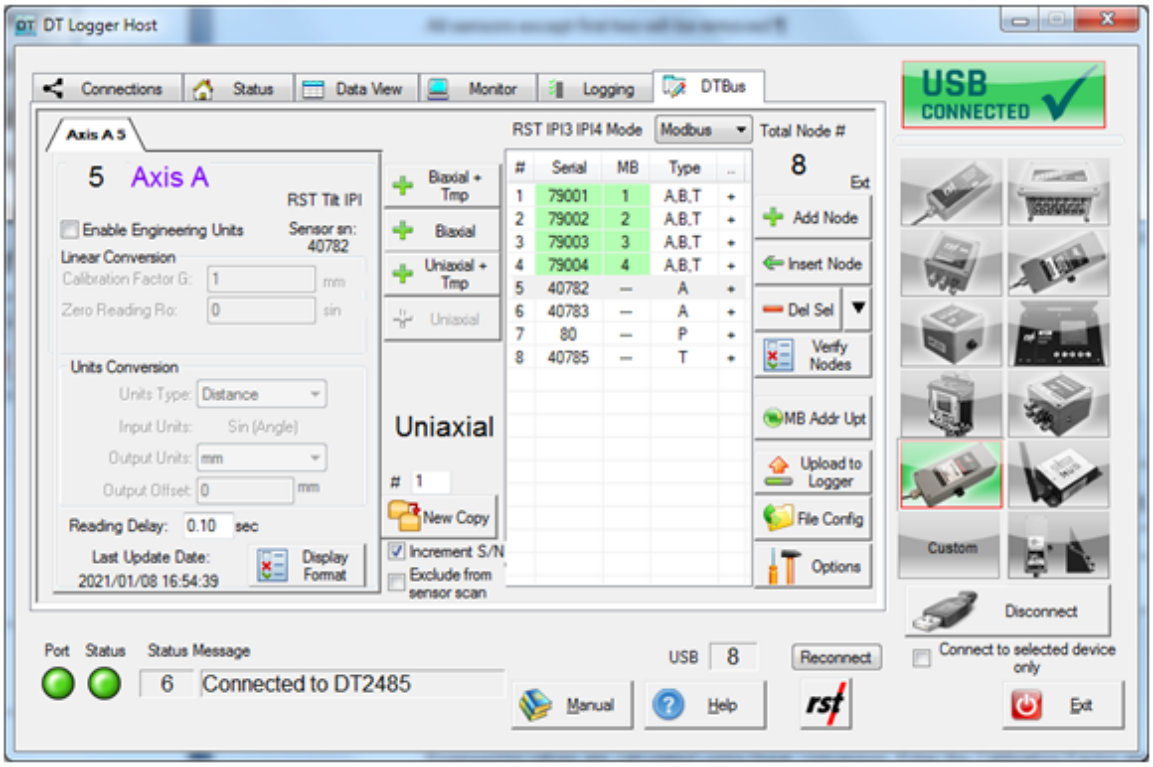


Figure 5-38 – DT-BUS Logger Sensors tab

All currently configured sensors are listed along with sensor index, sensor serial number and sensor type.
RST IPI3 and IPI4 DTBus sensors can be set up in one of two communication modes:

- ASCII mode
- Modbus mode

NOTE: Communication mode applies to RST IPI3 and RST IPI4 sensors only. RST IPI, RST Tilt Meter, RST Thermarray and RST Precision Liquid Settlement Array operate in ASCII communication mode only. **Beaded**stream operate in Modbus communication mode only

The sensor list can be modified using following controls:

Add Node

To add another RST Tilt IPI, IPI3, IPI4, RST Tiltmeter, RST Thermarray, RST PLSA or Modbus node, click Add Node button. The sensor configuration screen will change to reflect node type. New node will be added to the end of list.
To add beadedstream, click ***beaded****stream Search* to show setup dialog.

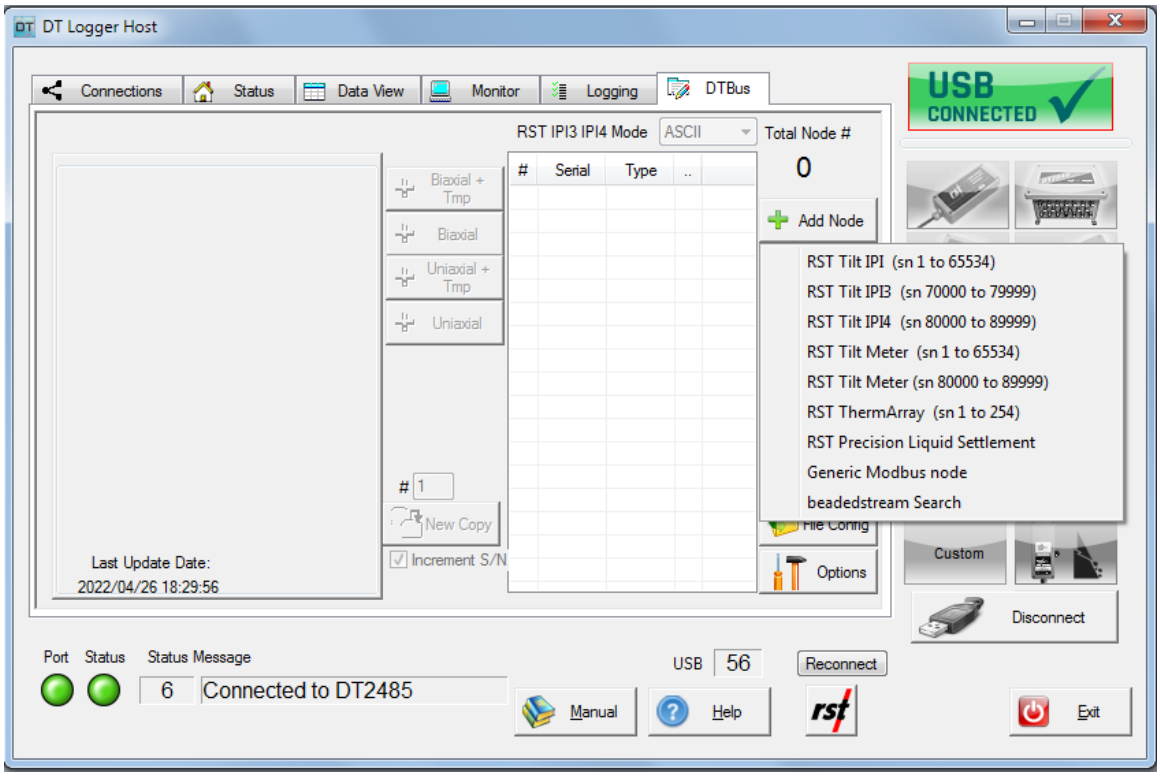


Figure 5-39 – DT-BUS Logger Add Sensors menu

NOTE: Available sensor menu will depend on logger firmware. Update logger firmware to enable all supported sensor types.

Insert Node

To insert sensor at the current position, click Insert Node. The sensor configuration screen will change to reflect node type.

New Copy

When adding subsequent sensors with identical parameters, click New Copy. Enter desired copy number to speed up the process

Delete Node

Used to remove currently displayed sensor from logger configuration.

Delete All Nodes

All sensors except first two will be removed.

To update selected node serial number, click on desired serial and type new value.

Verify Nodes

Use Verify Nodes feature to verify communication with connected sensors.

MB Addr Upt

When using Modbus communication mode, all modbus addresses need to be unique. Use Modbus Address Update button to program sequential modbus addresses into configured nodes.

Increment S/N

To help with adding sensors with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.

Exclude from sensor scan

Any sensor can be excluded from logger reading.

DT Bus IPI nodes may contain one or more sensors. To change number of child sensors, use the following buttons: *Biaxial + Temp, Biaxial, Uniaxial + Temp, Uniaxial.*

NOTE: When switching between child sensor types, click Uniaxial button first, then new sensor type button. Any unsaved sensors will be yellow highlighted in sensor list.

NOTE: RST IPI3 and RST IPI4 are permanently set with biaxial A and B and thermistor sensors.

To edit sensor labels, double-click sensor tab and edit label.

Often the user may wish to report the readings directly in engineering units, rather than generic units.

Conversion Method

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.

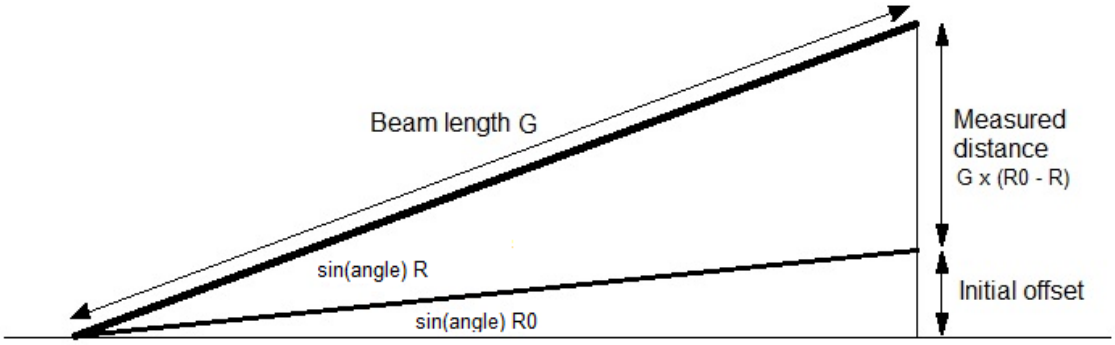


Figure 5-40 – Tilt Distance Calibration

Units Conversion

Units Type: Select from the list of available conversions.

Input Units: Depend on sensor type.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

RST IPI3 and IPI4 tilt sensors have two modes of operation: ASCII and Modbus.
In Modbus mode, each sensor node has modbus address in range 1 to 254.
Node serial numbers and Modbus addresses can be manually edited by clicking on “+” in node list.

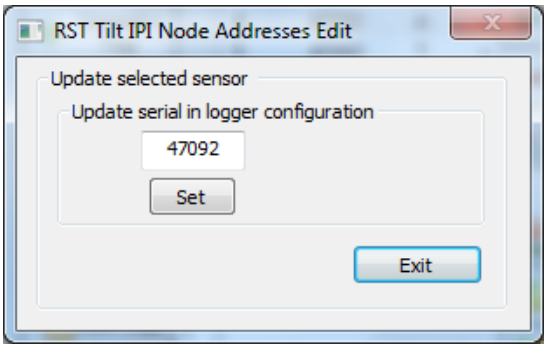


Figure 5-41 – RST Tilt IPI node address Edit dialog

Serial numbers can be updated in sensor setup without reloading entire sensor setup, if sensor number and sensor’s type was not changed.

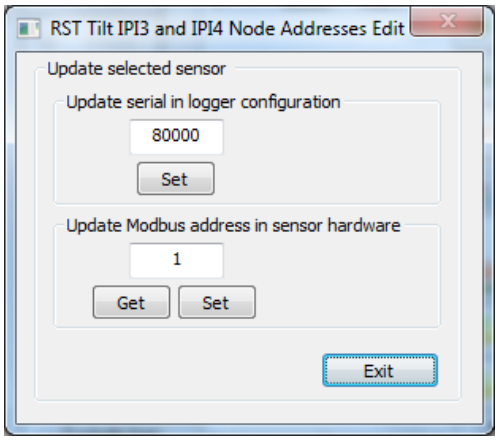


Figure 5-42 – RST Tilt IPI3 and IPI4 node address Edit dialog

RST Tilt IPI3 and IPI4 Node addresses edit dialog will provide options to read and update Modbus address. This feature is useful when using RST Tilt IPI3 nodes in Modbus mode.

NOTE: RST Tilt IPI sensors have serials in the range 1 to 65534.
RST Tilt IPI3 sensors have serial numbers in the 70000 to 79999 range.
RST Tilt IPI4 sensors have serial numbers in the 79999 to 89999 range.
Modbus addresses are between 1 and 254.

Options

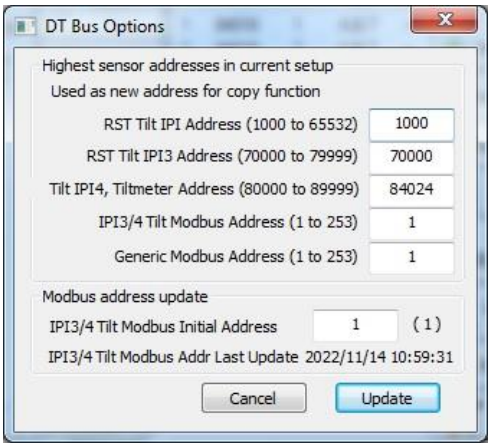


Figure 5-43 – DT Bus Options dialog

DT Bus Options dialog displays highest IPI sensor serial number and Modbus address.
Any displayed value can be changed if necessary.
IPI sensor initial Modbus address can be altered.
Last Modbus address update date and time is displayed as recorded in logger memory.

NOTE: IPI sensors and generic Modbus sensors highest addresses are general settings stored in local computer only.

5.5.5.b GENERIC MODBUS SENSORS CONFIGURATION

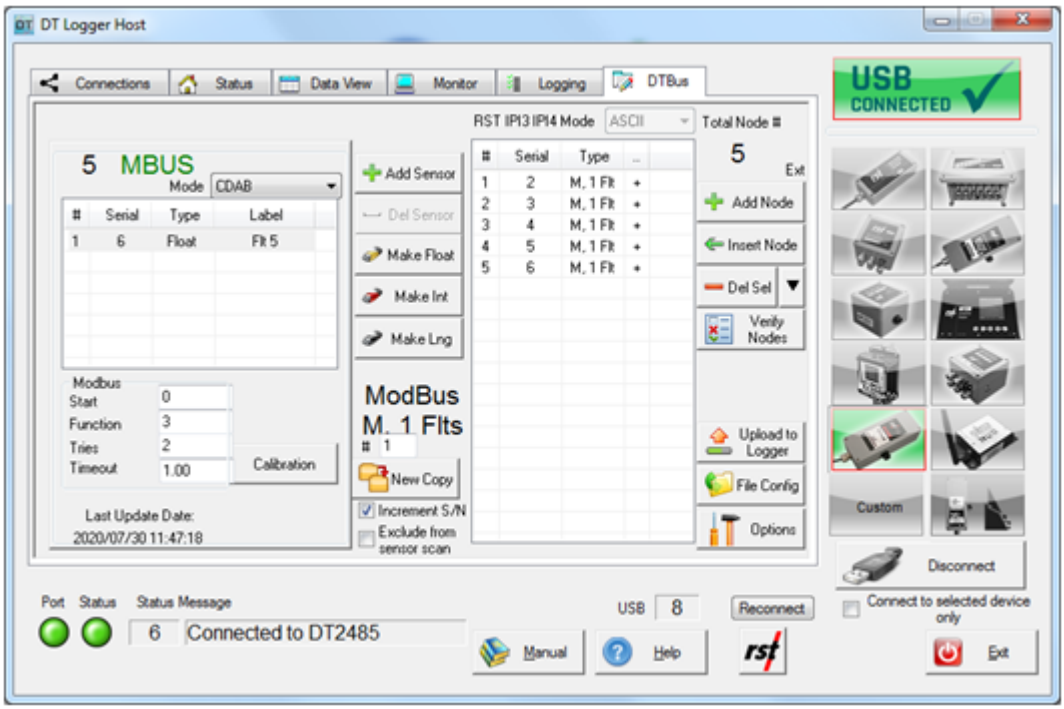


Figure 5-44 – ModBus Logger Sensors tab

All currently configured sensors are listed along with sensor index, sensor serial number and sensor type. The sensor list can be modified using following controls:

Add Node

To add another RST Tilt, RST Thermarray, RST PLSA or Modbus node, click Add Node button. The sensor configuration screen will change to reflect node type. New node will be added to the end of list.

Insert Node

To insert sensor at the current position, click Insert Node. The sensor configuration screen will change to reflect node type.

New Copy

When adding subsequent sensors with identical parameters, click New Copy. Enter desired copy number to speed up the process

Delete Node

Used to remove currently displayed sensor from logger configuration.

Delete All Nodes

All sensors except first two will be removed.

Use S/N entry box to edit selected node serial number.
To update selected node serial number, enter new serial into entry box and click *Update*.

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Increment S/N

To help with adding sensors with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.

NOTE: RST Tilt IPI4 sensors are not compatible with any other RST DT BUS sensors. To add RST Tilt IPI4 nodes, use the *Delete All* button and then right click on the remaining node. Select *Node Convert* to switch to IPI4 node type.

NOTE: ModBus sensor nodes have separate serial numbering.

ModBus nodes may contain one or more sensors. To change number of child sensors or sensor type, use the following buttons: Add Sensor, Delete Sensor, Make Float*, Make Int.*

NOTE: When switching between child sensor types, click Uniaxial button first, then new sensor type button. Any unsaved sensors will be yellow highlighted in the sensor list.

Often the user may wish to report the readings directly in engineering units, rather than generic units. Use *Calibration* button to edit each Modbus sensor calibration.

Conversion Method

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.

Units Conversion

Units Type: Select from the list of available conversions.

Input Units: Depend on sensor type.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

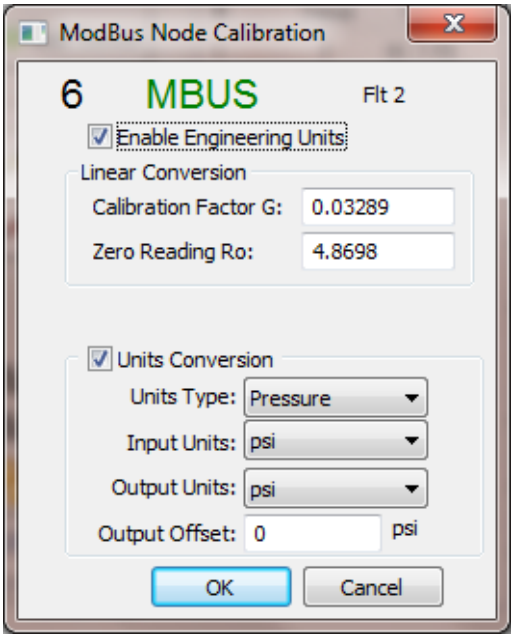


Figure 5-45 – ModBus sensors calibration

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

5.5.5.c BEADEDSTREAM TEMPERATURE ARRAY CONFIGURATION

To create new configuration, remove all sensors using *Remove All option in button next to Del Sel*, then click *Add Node* button and select ***beaded****stream Search* menu option.
In the pop-up dialog, there are two options:

- Detect and configure connected **beaded**stream automatically
- Configure number of nodes

When using first option, connected **beaded**stream is automatically detected and configured in logger memory.

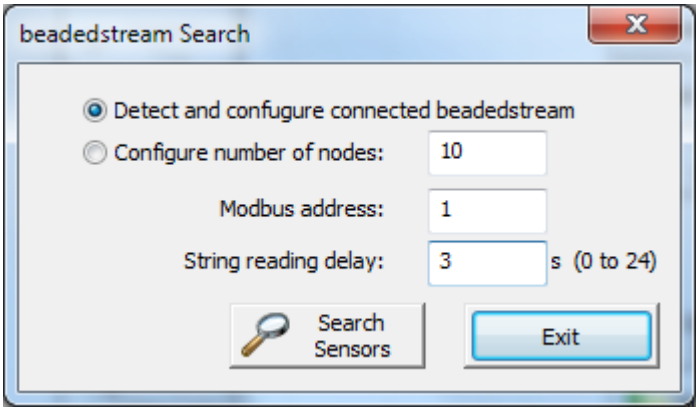


Figure 5-46 – Beadedstream Search dialog

Optionally, Modbus address and String reading delay can be customized if necessary.

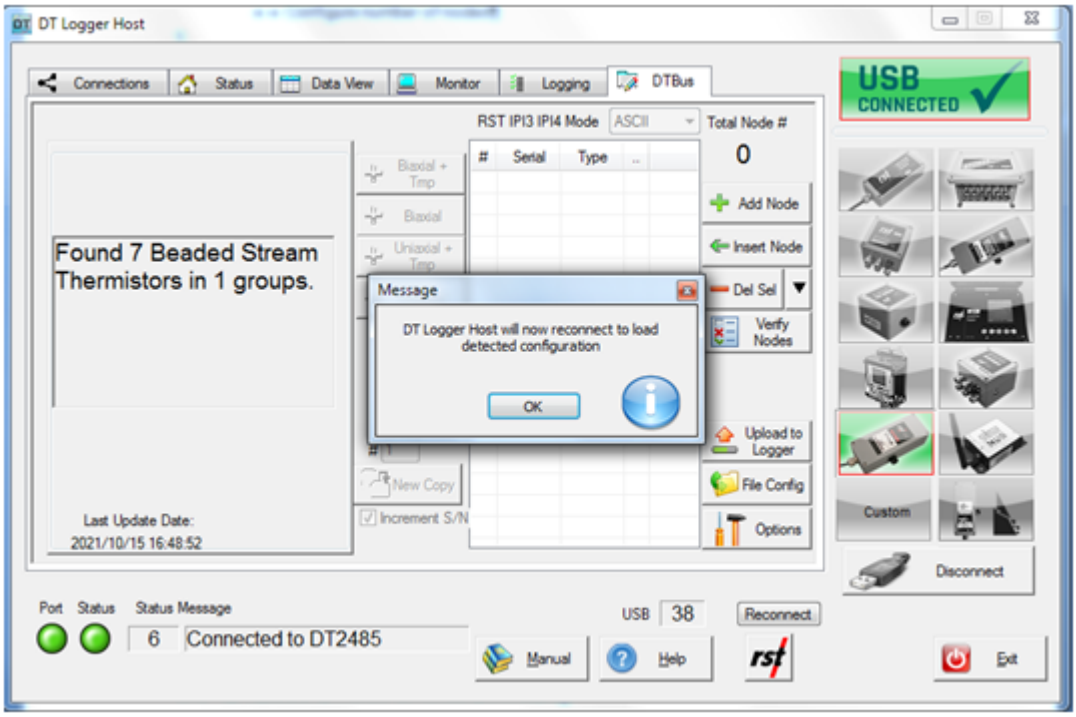


Figure 5-47 – Beadedstream Search result

The software will inform about search result and reload new settings.

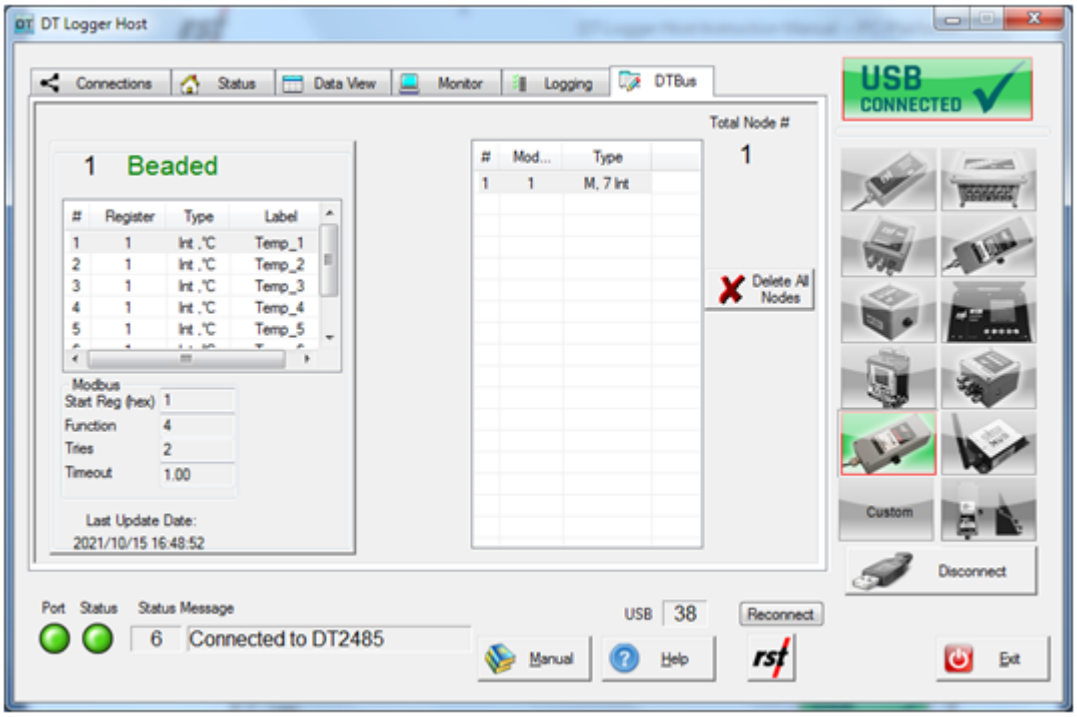


Figure 5-48 – Beadedstream Logger Sensors tab

All currently configured sensors are listed along with sensor index, Modbus address and sensor type.

5.6 DT2350 STRAIN GAUGE LOGGER

5.6.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

Figure 5-49 – DT2350 Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 123456). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The DT2350 Logger uses special long-life lithium batteries; contact RST for replacement part.

Board

Board revision level is helpful for diagnostic purposes.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 6 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.6.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

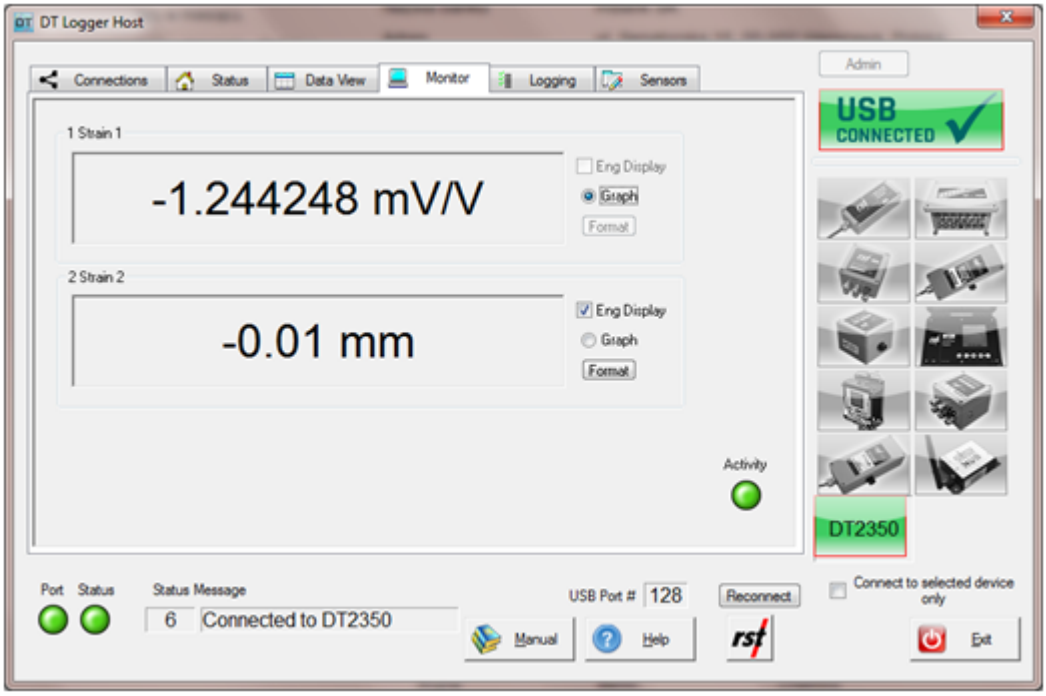


Figure 5-50 – DT2350 Logger Monitor tab

NOTE: Engineering Units are only available when sensor calibration data and conversion method is set in Sensors page. Please see section 5.6.5 for the instructions on entering calibration data.

Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

When Sensor Reading is outside of the valid range, “RANGE_ERR” will be displayed.

5.6.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

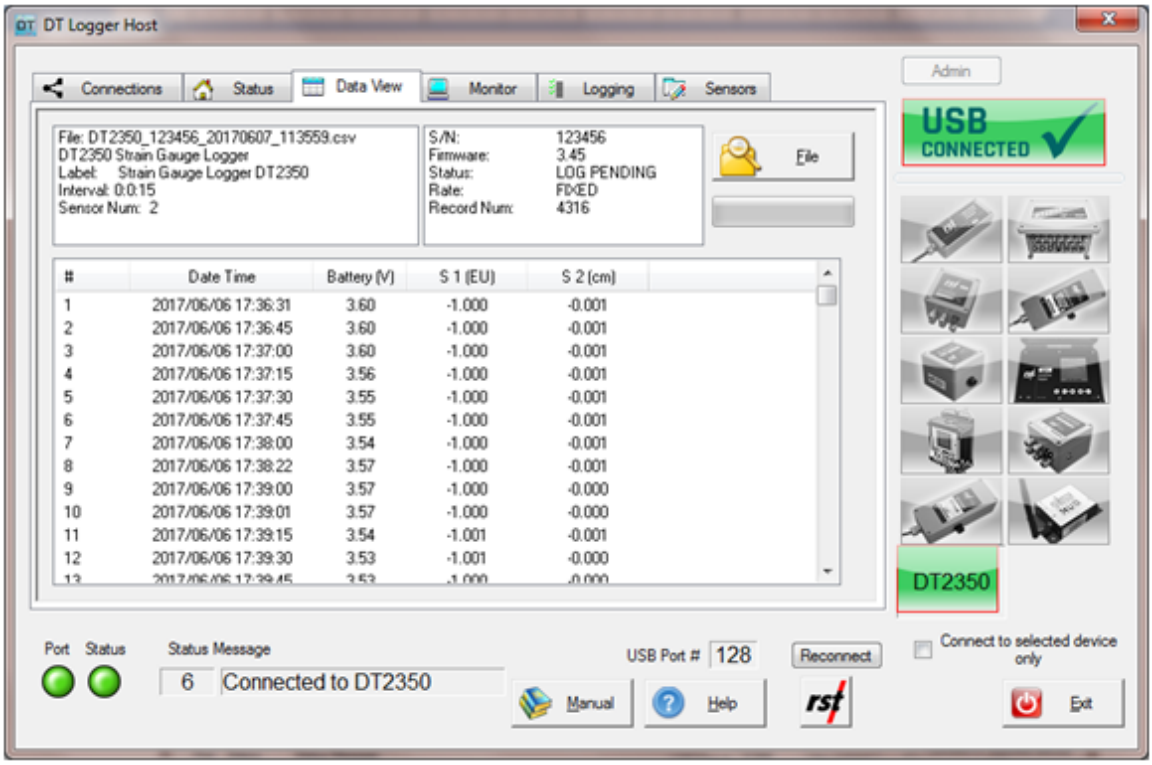


Figure 5-51 – DT2350 Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.6.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

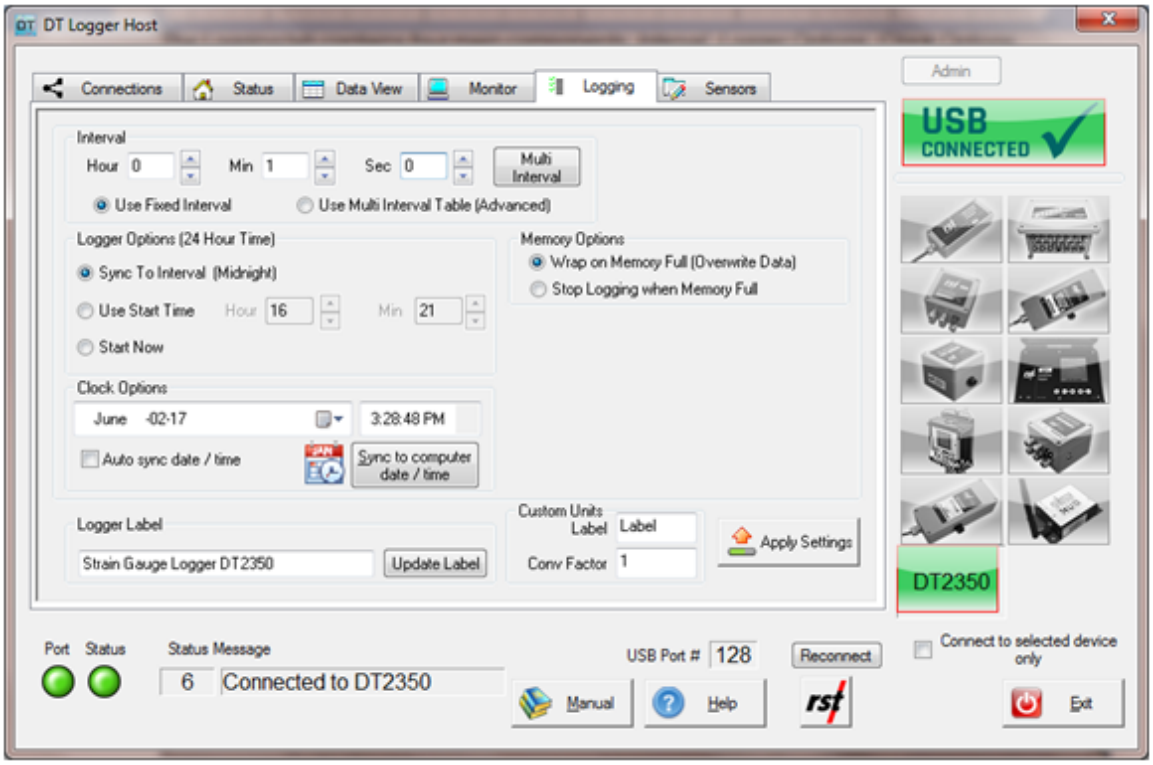


Figure 5-52 – DT2350 Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the “Use Fixed Interval” radio button and set within the main setup tab. Arrow buttons allow the user to scroll up or down pre-set values.

To setup the logger with multiple intervals, select the *Use Multi Interval Table (Advanced)* radio button. Clicking the “Multi Interval” button launches the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

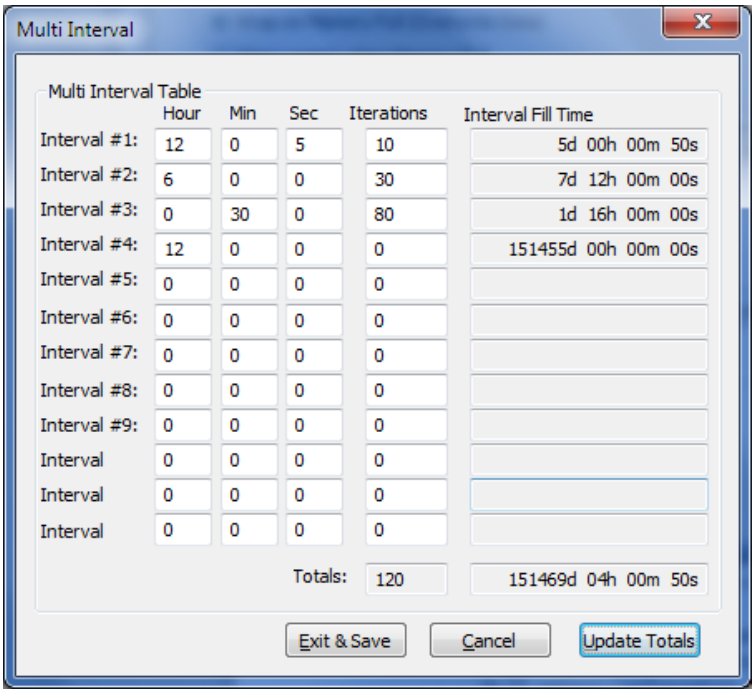


Figure 5-53 – Multi Interval table

The hour, minute, second and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on logger hardware. Multichannel logger data recording capability ranges from up to 303,030 records with 2 sensors connected and 106,470 records in 10 sensor configuration. Single Channel Loggers can hold up to a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Custom Units

The option is given to display and record sensor readings in engineering units other than predefined on Sensor tab. Enter desired label and conversion factor to add custom units. Then apply settings and use your custom units in Sensor configuration tab.
Custom Units option might not be available for some firmware versions. Check RST website for most up to date firmware version.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.6.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.

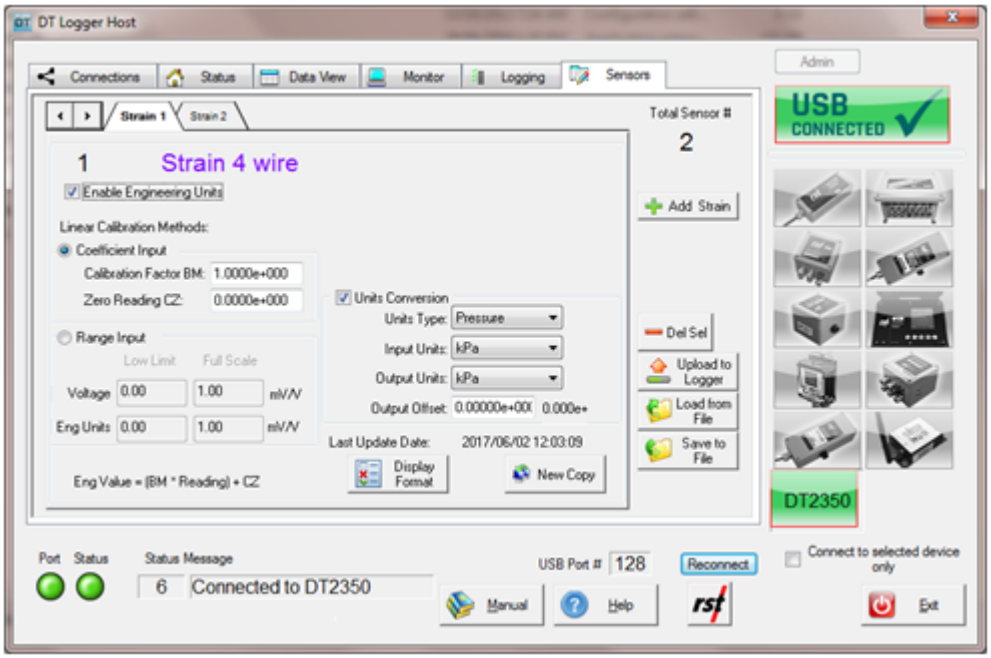


Figure 5-54 – DT2350 Logger Sensors tab

Strain Gauge Logger might be configured for one or two sensors. Use *Add Strain* to add second sensor. *Del Sel* button can be used to delete second sensor. Use *New Copy* to create second sensor configuration and copy all settings from first sensor.

Often the user may wish to report the readings directly in engineering units, rather than mV/V.

Conversion Method

Engineering values are calculated using linear conversion. Enter the Calibration Factor and Zero Reading into the appropriate boxes.
Alternatively, range input provides a way to automatically calculate coefficient parameters given range values.

Units Conversion

Units Type: Select from the list of available conversion types.

Input Units: Select the unit type matching sensor calibration sheet.

Output Units: Select the appropriate output units from the drop-down list. The conversion will be done automatically resulting in desired units displayed in Monitor tab and recorded in downloaded file data.

Output Offset: This is a user defined offset value.

Display Format

Customize monitor display settings. Option is given to alter precision or switch to scientific display.

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

5.7 GAA2820 GEO ACOUSTIC AWARE LOGGER

5.7.1 STATUS

The status tab contains five main components: *Logger, Sampling, Battery, Board* and *Memory.*

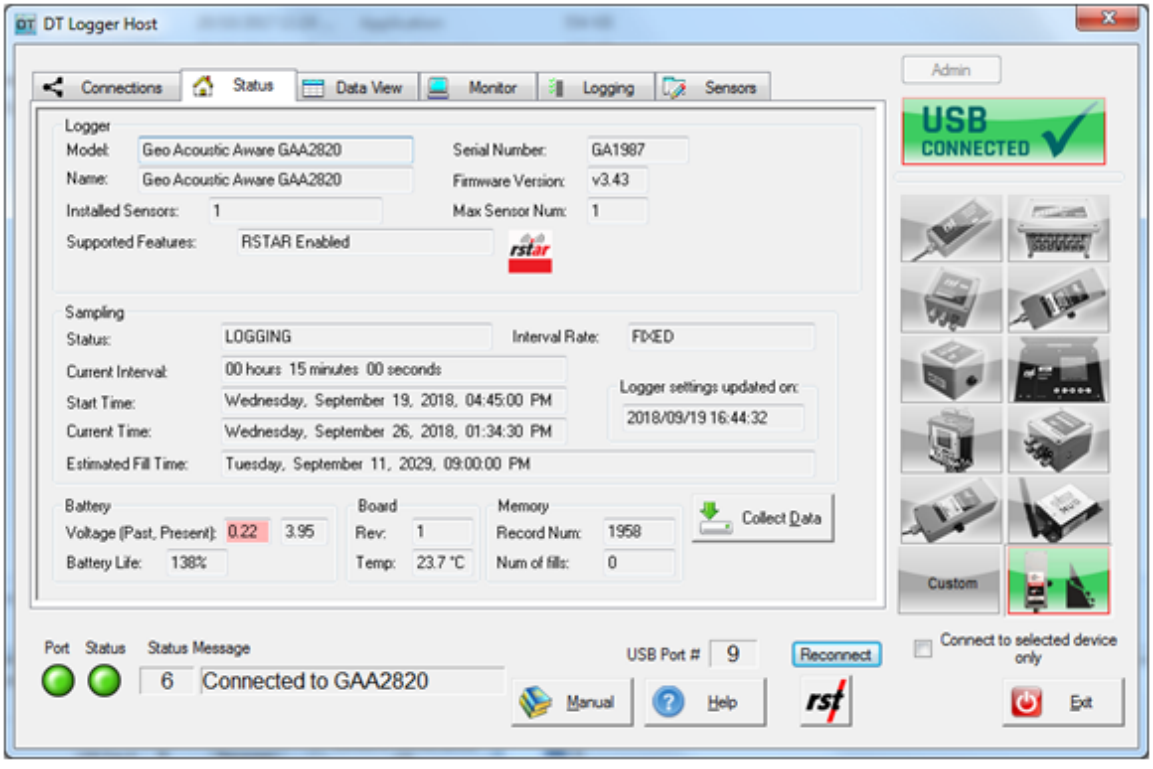


Figure 5-55 – GAA2820 Status tab

Logger

Provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, alarm status, configured sensors and features. Ensure that the serial number matches what is expected (in this example it is 12345). If it

does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

Shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

Displays the current battery voltage, past battery voltage recorded when sample taken and the estimated battery life. To ensure uninterrupted operation, replace battery when estimated battery life is getting low. Battery indicator turns red when estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability and the version of the installed firmware.

Refer to Section 8 for information about battery life and battery replacement. The GAA2820 Logger uses special long-life lithium batteries; contact RST for replacement part.

Board

Board revision level is helpful for diagnostic purposes.

Memory

Shows the current logger memory usage.

Collect Data

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can be pressed. The program will download the data (a progress bar will be displayed) and automatically write it to a *.csv file. Please see section 0 for the *.csv file format.

NOTE: When pressing the *Collect Data* button, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected (and no parameters have been changed) it will download the current readings and all of the previous data to a *.csv file.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

After successful data download, *View Recent File* button appears. Use this button to quickly display downloaded file in Data View tab.

5.7.2 MONITOR

Selecting the monitor tab sets the data logger into monitor mode. By default, the screen reports in % of the detected potentiometer ratio.

If successfully connected to the data logger, the sensor reading is updated approximately once per two seconds. Green indicator flashes each time a sensor data is updated. Clicking the check boxes changes the display to Engineering Units.

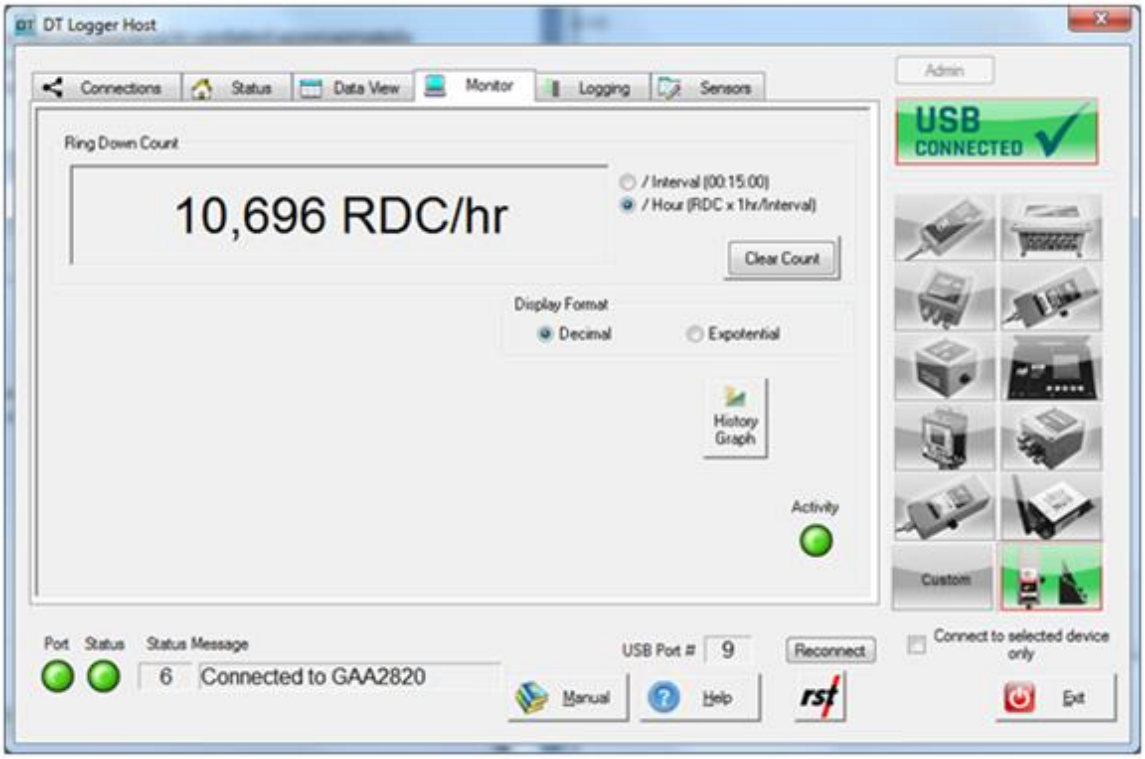


Figure 5-56 – GAA2820 Logger Monitor tab

NOTE: Until communication is established with the data logger, the program will display ”---- “ in Sensor Reading fields.

Graphical Monitor Historical

The History Graph button invokes the data logger historical graph. The historical graph displays the recently downloaded file in a Sensor Reading vs. Time graph.

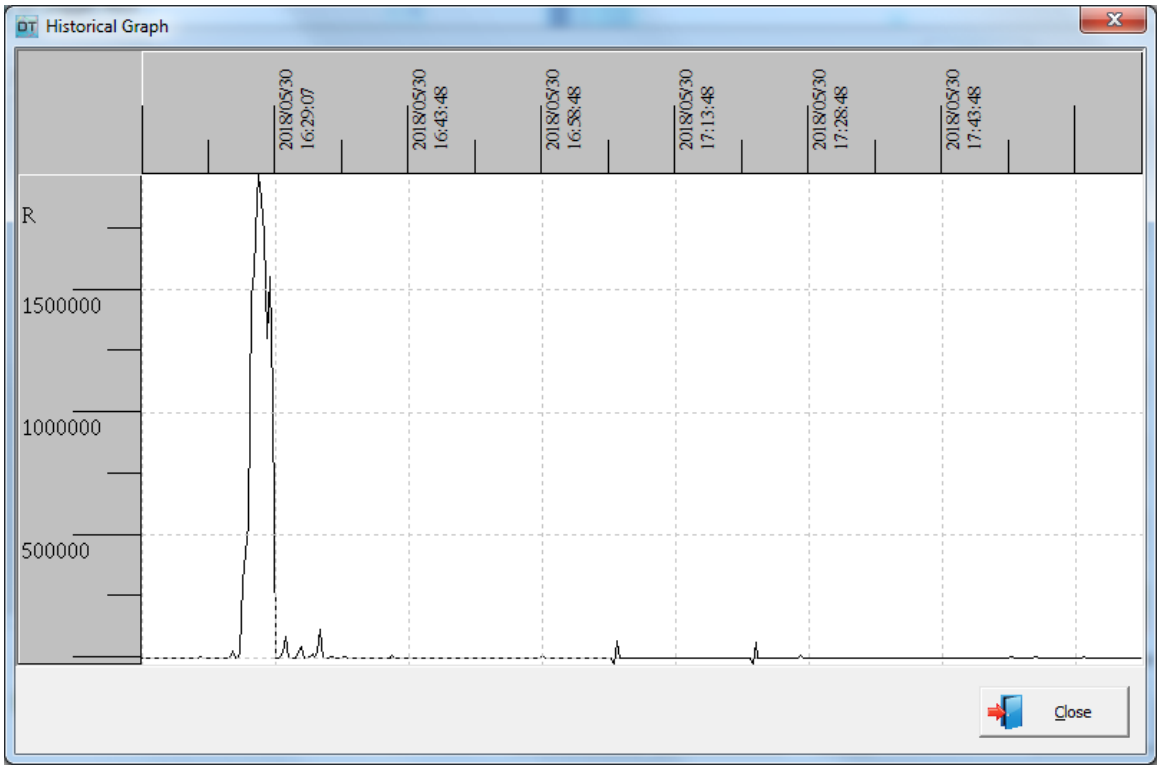


Figure 5-57 – GAA2820 Logger Graphical monitor

The *Properties* menu option launches the Graphical Monitor Options dialog, which allows the user to manipulate the graph.

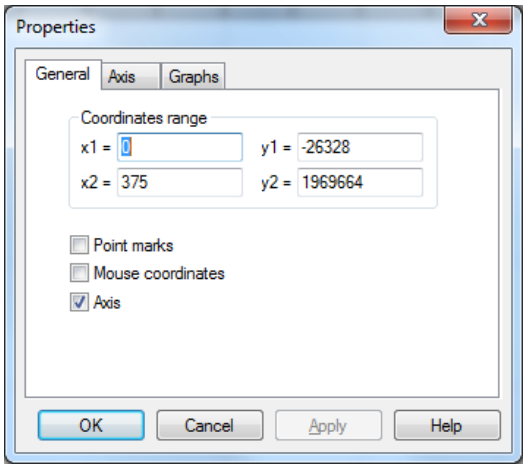


Figure 5-58 – Historical graph properties

5.7.3 DATA VIEW

The Data View tab allows quick preview of logger data files.

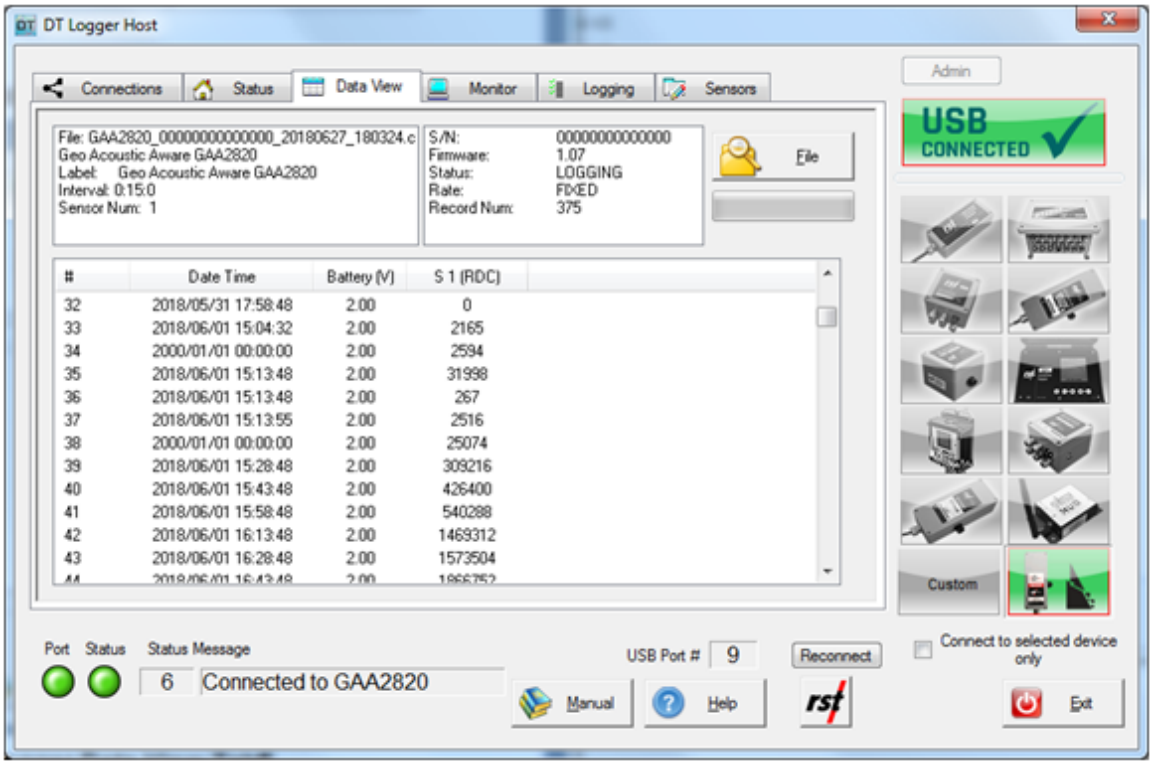


Figure 5-59 – GAA2820 Logger Data View tab

NOTE: Data View displays major data logger settings and all saved data records. Use text file viewer or spreadsheet program (ex. MS Excel™) to see entire file.

5.7.4 LOGGING

The Logging tab contains four main components: *Interval, Logger Options, Clock Options* and *Logger Label.*

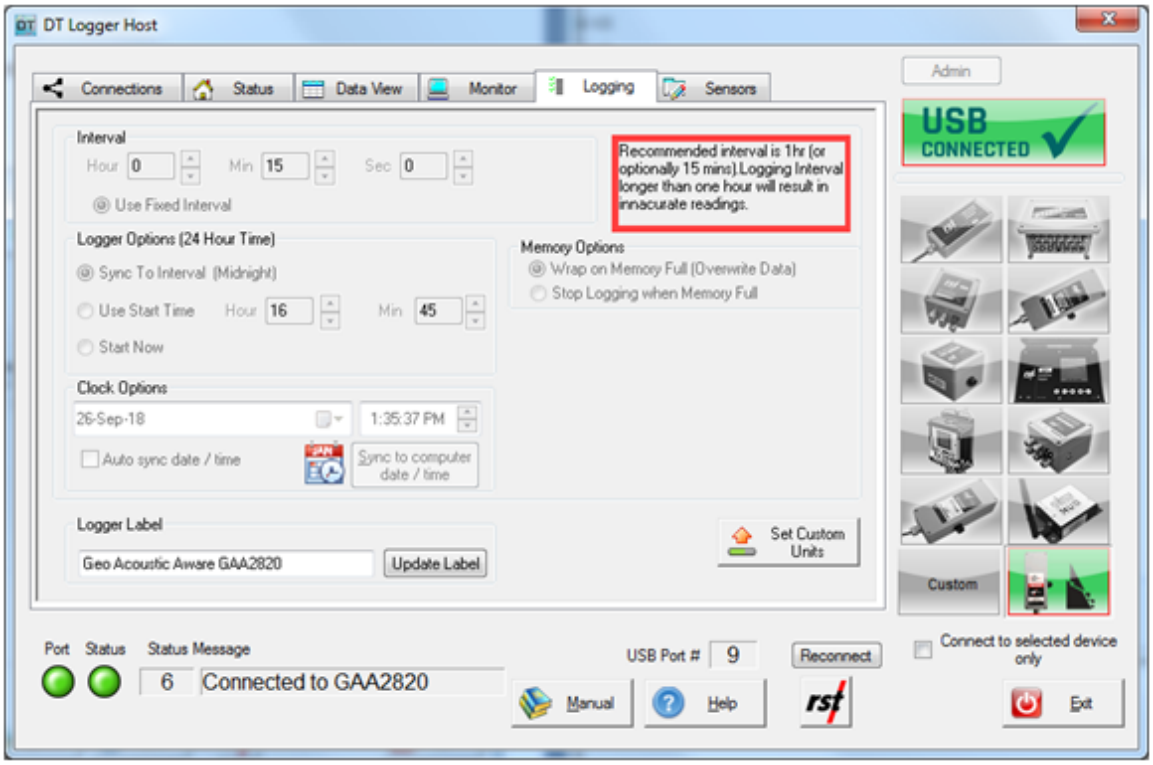


Figure 5-60 – GAA2820 Logging tab

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

Interval

This section is used to set the logging interval. Only *Fixed Interval* is available. Arrow buttons allow the user to scroll up or down pre-set values.

GAA2820 logger memory can hold 606,060 records.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e. for some time in the future, the *Status* will read *Log Pending* until that interval is reached.

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Clock Options

Allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger internal clock each time *Apply* button is pressed.

Logger Label

Custom label can be entered if desired.

Apply Settings Button

After any changes have been made on the data logger *Logging* screen, pressing the *Apply Setting* button saves these changes and uploads them to the data logger's memory.

NOTE: During logging settings upload, all existing logger data will be erased. Ensure to download data prior to changing logging settings. Sensor configuration will not be affected.

5.7.5 SENSORS

Sensors tab shows current sensor configuration. It also enables the user to modify sensor configuration to reflect customized requirements.

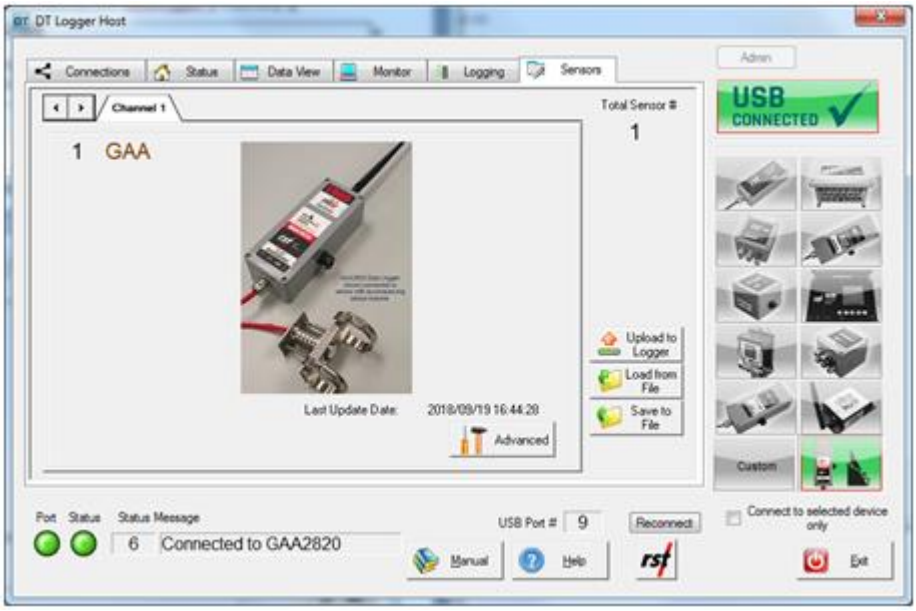


Figure 5-61 – GAA2820 Logger Sensors tab

Geo Acoustic Aware Logger has one sensor.

Advanced

This dialog allows customization of sensor gain, hysteresis, and masking. Any changes should be coordinated with RST Instruments support personnel.

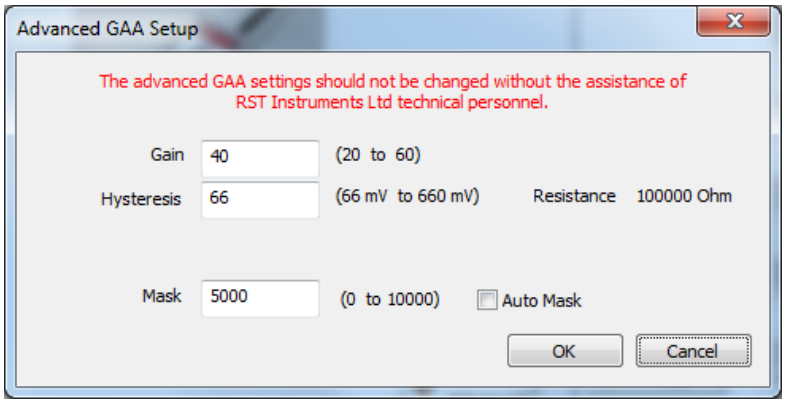


Figure 5-62 – GAA2820 Logger Advanced Sensors tab

Upload to logger

As a reminder, whenever **ANY** changes are made under the Sensors tab, the Upload to Logger button must be pressed in order to update the logger with new information.

NOTE: Before sensor settings upload, the program will give a choice to keep or erase the data currently contained in the data logger. If the data logger memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a *.csv file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Save to File

Current sensor settings can be saved to a file for later retrieval.

Load from File

Click this button to load previously saved sensor settings.

5.8 DTSAA SHAPEARRAY LOGGER

5.8.1 STATUS

The status tab contains five sections: *Logger, Sampling, Battery, Board* and *Memory.*

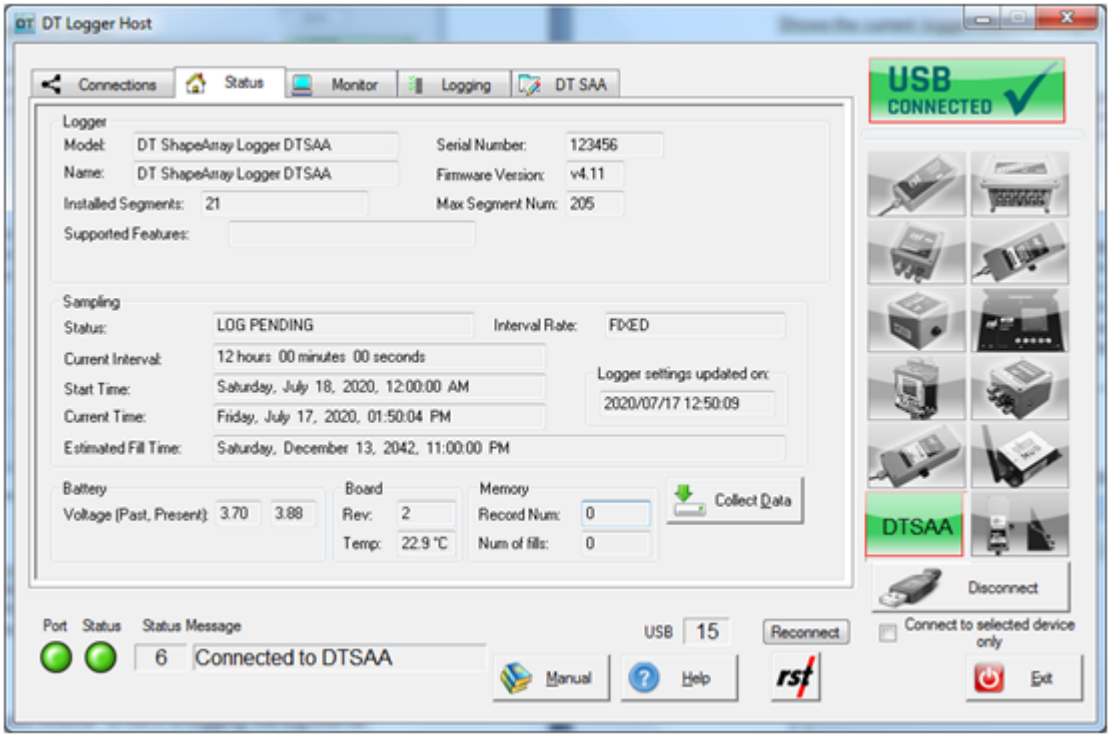


Figure 5-63 – DTSAA Status tab

Logger

The logger section provides information about the currently connected data logger. This includes the model, name, serial number, firmware version, and features. Ensure that the serial number matches what is expected (in this example it is 123456). If it does not, check the status indicators at the bottom of the screen to ensure a connection with the logger has been established.

Sampling

The sampling section shows the status of the logger. This includes whether or not it is logging, the log interval, and various time parameters.

Battery

The battery section displays the current battery voltage, the past battery voltage recorded when the sample was taken, and the estimated remaining battery life. To ensure uninterrupted operation, replace the battery when the estimated battery life is getting low. The battery indicator turns red when the estimated battery life is 20% or less.

NOTE: The “Battery Past” value depends on recorded data availability.

Refer to Section 8 for information about battery life and battery replacement. The DTSAA Logger uses special long-life lithium batteries. Contact RST for replacements.

Board

The board section consists of the board revision level and board temperature. The board revision level is helpful for diagnostic purposes.

Memory

The memory section displays the current logger's memory usage.

Collect Data Button

If the data logger has already been configured to collect data at a specified interval, the *Collect Data* button can then be used to download the data (a progress bar will be displayed) and automatically write it to a .dat file. Downloaded files are intended to be used with Measurand's SAA Suite software.

NOTE: When clicking on the *Collect Data* button, the program will provide the option to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected (and no parameters have been changed), it will download the current readings and all of the previous data to a file. The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging* tab. The program will prompt you to confirm erasing the data.

5.8.2 MONITOR

Selecting the Monitor tab sets the data logger into monitor mode.

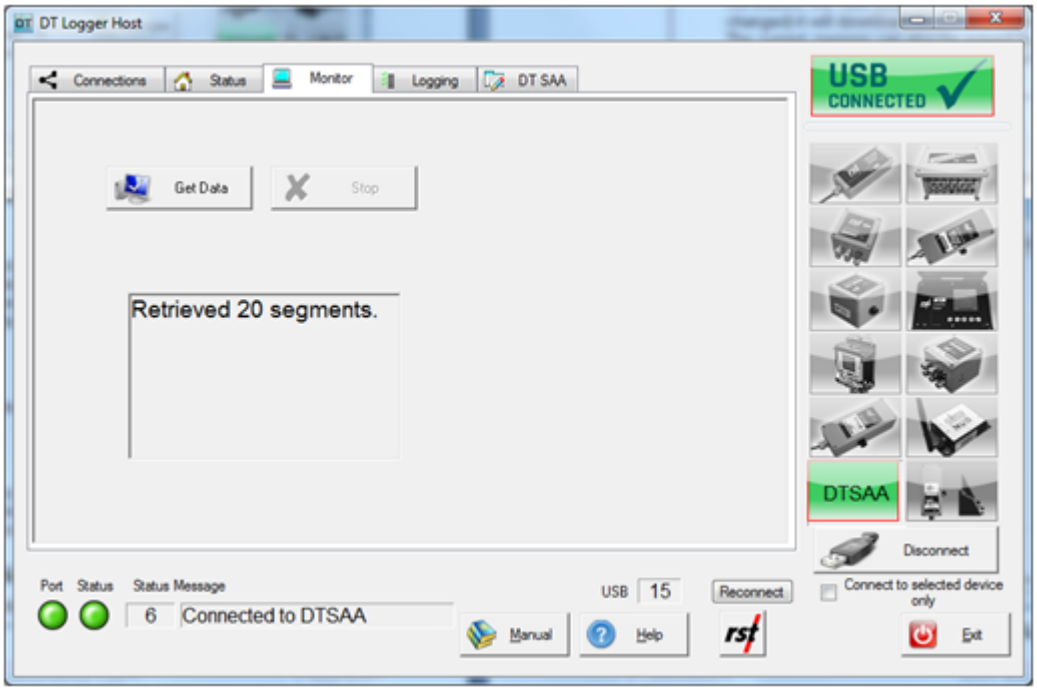


Figure 5-64 – DTSAA Logger Monitor tab

Click *Get Data* to save current array values into .dat files.

5.8.3 LOGGING

The Logging tab contains four sections: *Interval, Logger Options, Clock Options* and *Logger Label.*

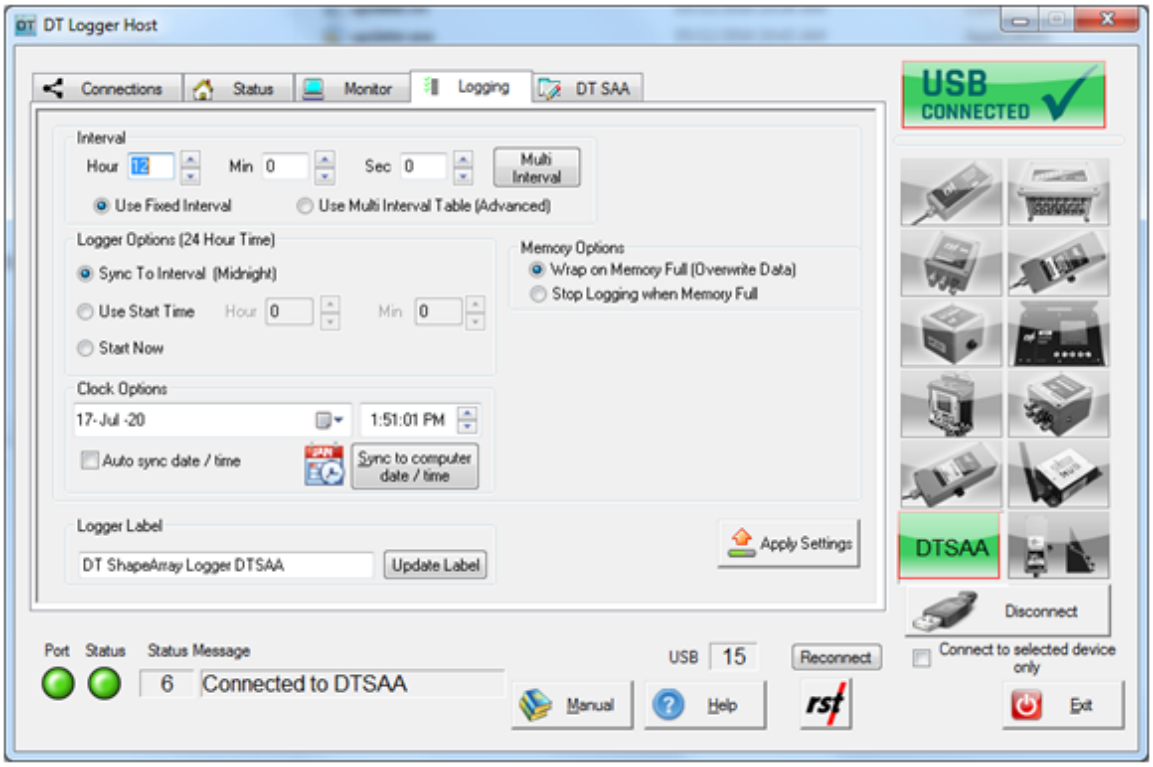


Figure 5-65 – DTSAA Logging tab

NOTE: When clicking on the *Collect Data* button, the program will provide the option to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected (and no parameters have been changed), it will download the current readings and all of the previous data to a file.

Interval

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. To set the data logger to read at fixed intervals, select the "Use Fixed Interval" radio button and use the arrows on the Hour, Min, and Sec fields to scroll through pre-set values.

To set up the logger with multiple intervals, select the "Use Multi Interval Table (Advanced)" radio button. This will launch the Multi Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

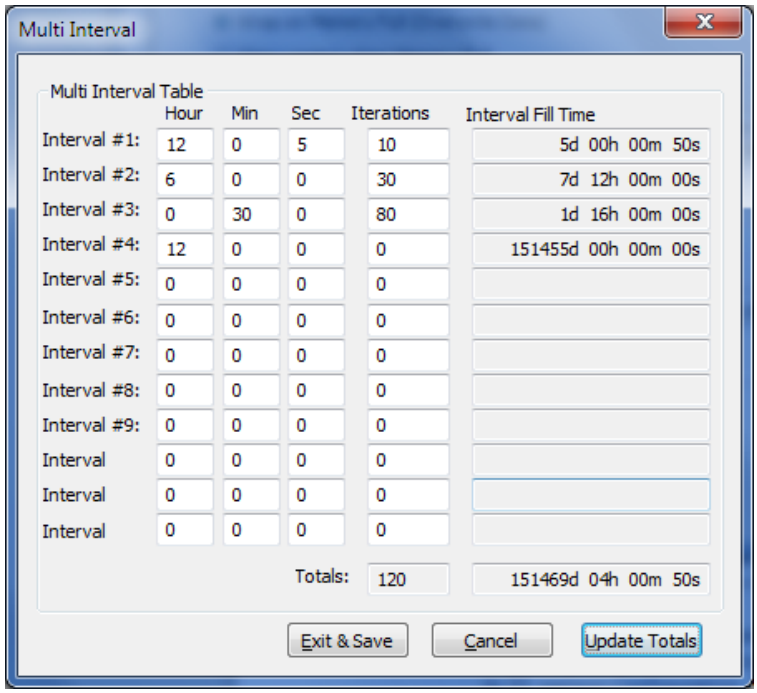


Figure 5-66 – Multi Interval table

The hour, minute, second, and number of iterations per interval must be specified.

NOTE: Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logger will continue at the last iteration rate.

The memory capacity depends on the logger's hardware. The dialog features an Interval Fill Time field, which allows the user to see the exact time the interval iterations will be completed, relative to the start time of the interval. To update both the *Interval Fill Time* and *Total Iterations field*, click the "*Update Totals*" button. To save changes, click the "*Exit & Save*" button.

Logger Options

Use Start Time: A check box can be selected to enable a custom start time. The hour and minute can be entered in 24-hour format.

NOTE: If a custom start time is entered and this time has already past, the logger will not start until 24 hours has passed. For example: If the current time is 13:01 and the start time is set to 13:00, the data logger will not start logging data until 13:00 *the next day*.

If a custom start time is applied, i.e., for some time in the future, the *Status* on the bottom of the screen will read *Log Pending* until that interval is reached.

Memory Options

This section has two options: *Wrap on Memory Full (Overwrite Data)* and *Stop Logging When Memory Full.*

Wrap on Memory Full (Overwrite Data): When the data logger memory becomes full, it will overwrite itself.

Stop Logging when Memory Full: Datalogger stops collecting data when it reaches its memory storage limit.

Clock Options

This section allows the user to set the date and time of the data logger. Pressing the *Sync to Computer Date / Time* and clicking *Apply* synchronizes the data logger clock to that of the PC it is currently connected to. Checking the *Auto Sync Date / Time* checkbox will update data logger's internal clock each time *Apply* button is pressed.

Logger Label

A custom label for the logger can be entered, if desired.

Apply Settings Button

After any changes have been made to the data logger's *Logging* screen, click on the *Apply Setting* button to save these changes, and upload them to the data logger's memory.

NOTE: During the logging settings upload, all existing logger data will be erased. Be sure to download any data on the logger prior to changing the logging settings. Sensor configurations will not be affected.

5.8.4 DTSAA TAB

The DTSAA is designed to discover ShapeArray sensors and configure the datalogger settings automatically.

Array Segment Configuration

The DTSAA tab lists all of the segments in the array, along with the segment index, segment serial number, and segment type.

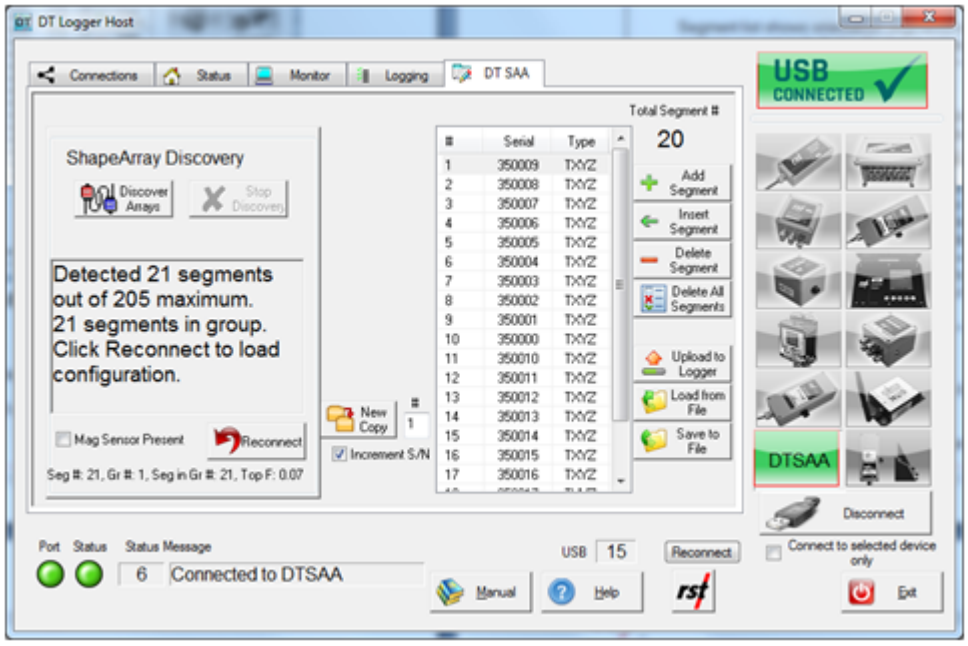


Figure 5-67 – DTSAA Segment Setup tab

Discover Arrays

To discover ShapeArray sensor nodes, click on *Discover Arrays*. The logger will initiate a device reading to discover sensor nodes.

It will take about 10 seconds for the discovery status to be displayed. If a ShapeArray is correctly discovered, the logger will configure itself to log the discovered ShapeArray. Click the Reconnect button to load previously discovered arrays.

NOTE: Running *Discover Arrays* will reconfigure logging. Any previous data logged should be downloaded before using *Discover Arrays*.

Magnetometer sensors

To include magnetometer sensors, place a checkmark into the *Mag Sensor Present* checkbox.

NOTE: The segment list shows orientation segments only. Status segment and magnetometer sensors are not included in the list, but they will be written to logger configuration.

New Copy

When adding subsequent segments to the array, click *New Copy*. Enter the desired number of copies to speed up the process.

Increment S/N

To help with adding segments with subsequent serial numbers, place check mark into *Increment S/N* checkbox. Each added or inserted serial number will be automatically incremented.

The segment list can be modified using following controls:

Add Segment

To add another segment to the array, click the *Add Segment* button. The new segment will be added to the end of list.

Insert Segment

To insert a segment at the current position, click *Insert Segment*.

Delete Segment

Remove currently displayed segments from a logger configuration by clicking *Delete Segment*.

Delete All Segments

To remove all segments except first one, click *Delete All Segments.*

To update selected segment serial number, click on desired serial and type new value.***Upload to logger***

As a reminder, whenever **ANY** changes are made under the Segments tab, the *Upload to Logger* button MUST be clicked to update the logger with new information.

NOTE: Before uploading sensor settings, the program will ask whether to keep or erase the data currently contained in the data logger. If the data logger's memory is not erased, the next time the data is collected, it will download the current readings and all of the previous data to a file. Current sensor calibration settings will be applied to calculate engineering values from all recorded data.
The current memory can also be erased by pressing the ***Apply Settings*** under the *Logging tab*. The program will prompt you to confirm the erasing of data from its memory.

Load from File

Click this button to load previously saved segment settings.

Save to File

Current segment settings can be saved to a file for later retrieval.

6 DATA FILES (*.CSV)

Whenever the *Collect Data* button is pressed under the *Status* tab, the software will collect all the current data stored in the memory of the data logger. A progress bar will be displayed showing the status of this collection.

The software will automatically write the data to a *.csv file in the data directory. The default data directory is **My Documents\Multichannel.** Data directory can be changed using Data File Folder dialog box. The *.csv file has the following format:

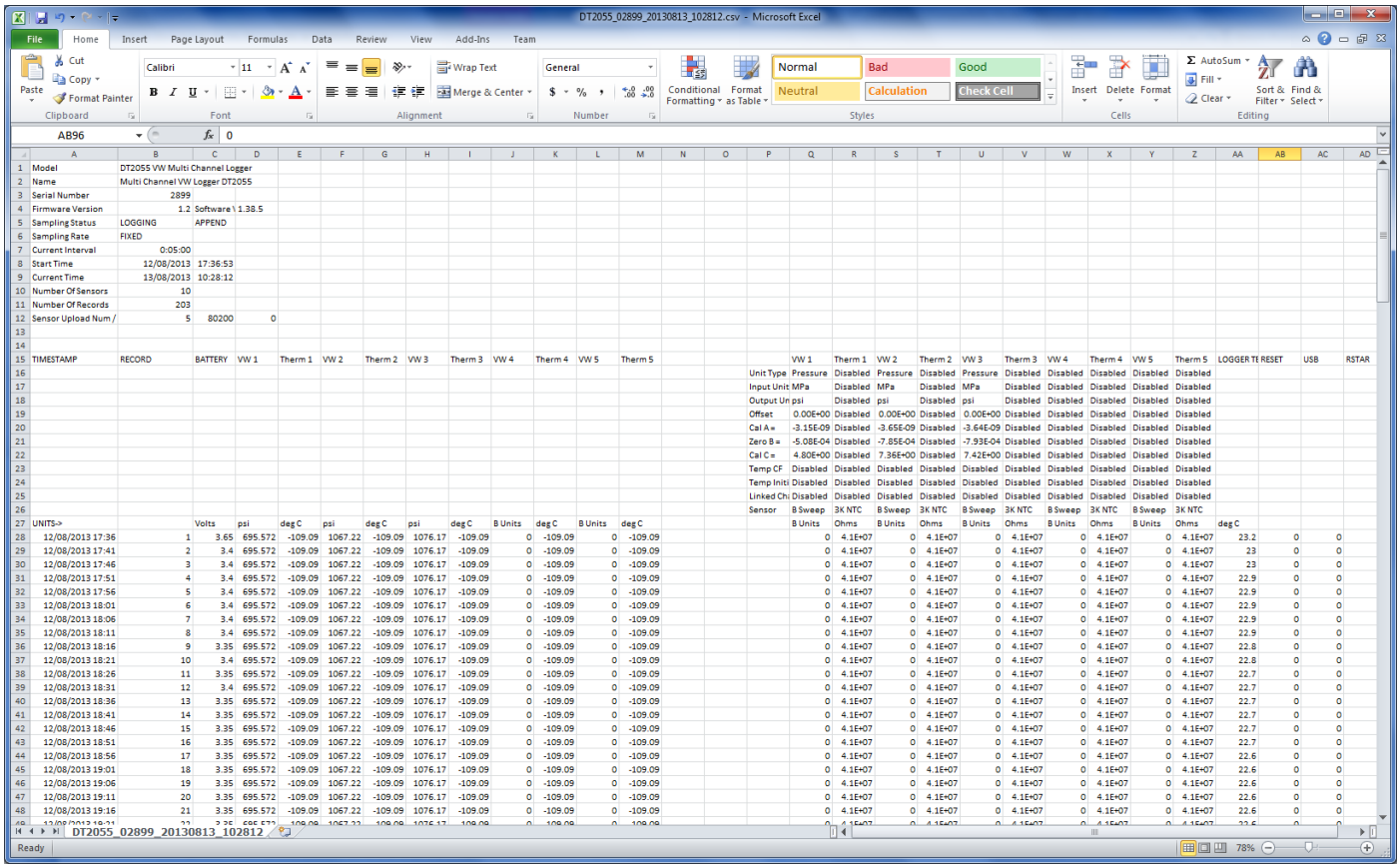
<ID>_serialnumber_yymmdd_hhmmss.csv

where <ID> prefix represents the instrument model (DT2011B, DT2055, DT2055B, DT2040, IC6656L,DTL201B-2B, IC6560, DT4205, DT2306, DT2350, DT2485, DTSAA).

The data file can then be opened directly with Microsoft Excel™ or other spreadsheet programs. A new file will be created each time the data is collected. It is the user's responsibility to copy data into a single spreadsheet if desired.

6.1 VIBRATING WIRE LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Model	DT2055 VW Multi Channel Logger											
2	Name	Multi Channel VW Logger DT2055											
3	Serial Number	2899											
4	Firmware Version	1.2	Software \	1.38.5									
5	Sampling Status	LOGGING	APPEND										
6	Sampling Rate	FIXED											
7	Current Interval	0:05:00											
8	Start Time	12/08/2013	17:36:53										
9	Current Time	13/08/2013	10:28:12										
10	Number Of Sensors	10											
11	Number Of Records	203											
12	Sensor Upload Num /	5	80200	0									
13													
14													
15	TIMESTAMP	RECORD	BATTERY	VW 1	Therm 1	VW 2	Therm 2	VW 3	Therm 3	VW 4	Therm 4	VW 5	Therm 5
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27	UNITS->		Volts	psi	deg C	psi	deg C	psi	deg C	B Units	deg C	B Units	deg C
28	12/08/2013 17:36	1	3.65	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
29	12/08/2013 17:41	2	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
30	12/08/2013 17:46	3	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
31	12/08/2013 17:51	4	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
32	12/08/2013 17:56	5	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
33	12/08/2013 18:01	6	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
34	12/08/2013 18:06	7	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
35	12/08/2013 18:11	8	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
36	12/08/2013 18:16	9	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
37	12/08/2013 18:21	10	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
38	12/08/2013 18:26	11	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
39	12/08/2013 18:31	12	3.4	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
40	12/08/2013 18:36	13	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
41	12/08/2013 18:41	14	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
42	12/08/2013 18:46	15	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
43	12/08/2013 18:51	16	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
44	12/08/2013 18:56	17	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
45	12/08/2013 19:01	18	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
46	12/08/2013 19:06	19	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
47	12/08/2013 19:11	20	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09
48	12/08/2013 19:16	21	3.35	695.572	-109.09	1067.22	-109.09	1076.17	-109.09	0	-109.09	0	-109.09

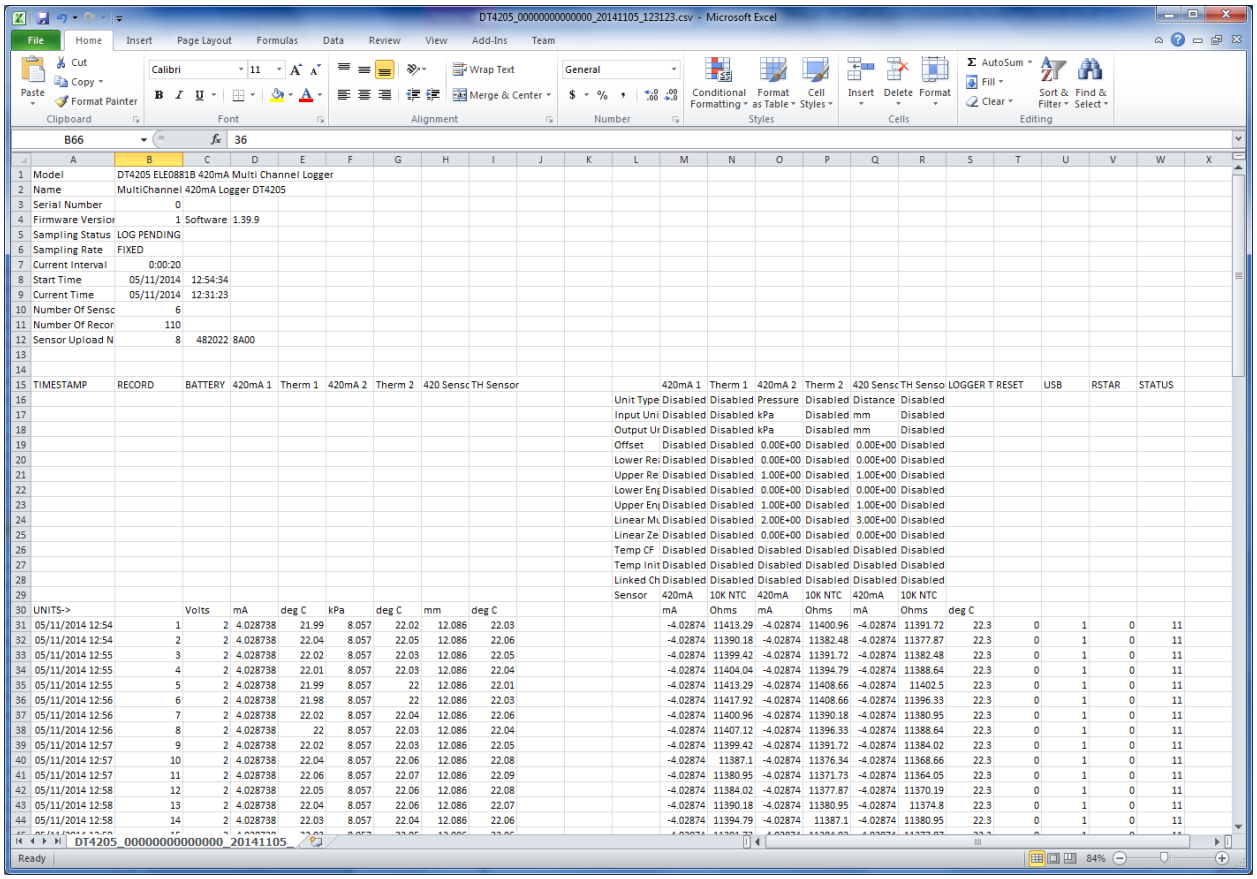
	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
15		VW 1	Therm 1	VW 2	Therm 2	VW 3	Therm 3	VW 4	Therm 4	VW 5	Therm 5	LOGGER TE	RESET	USB	RSTAR
16	Unit Type	Pressure	Disabled	Pressure	Disabled	Pressure	Disabled	Disabled	Disabled	Disabled	Disabled				
17	Input Unit	MPa	Disabled	MPa	Disabled	MPa	Disabled	Disabled	Disabled	Disabled	Disabled				
18	Output Un	psi	Disabled	psi	Disabled	psi	Disabled	Disabled	Disabled	Disabled	Disabled				
19	Offset	0.00E+00	Disabled	0.00E+00	Disabled	0.00E+00	Disabled	Disabled	Disabled	Disabled	Disabled				
20	Cal A =	-3.15E-09	Disabled	-3.65E-09	Disabled	-3.64E-09	Disabled	Disabled	Disabled	Disabled	Disabled				
21	Zero B =	-5.08E-04	Disabled	-7.85E-04	Disabled	-7.93E-04	Disabled	Disabled	Disabled	Disabled	Disabled				
22	Cal C =	4.80E+00	Disabled	7.36E+00	Disabled	7.42E+00	Disabled	Disabled	Disabled	Disabled	Disabled				
23	Temp CF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled				
24	Temp Initi	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled				
25	Linked Ch	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled				
26	Sensor	B Sweep	3K NTC	B Sweep	3K NTC	B Sweep	3K NTC	B Sweep	3K NTC	B Sweep	3K NTC				
27		B Units	Ohms	B Units	Ohms	B Units	Ohms	B Units	Ohms	B Units	Ohms	deg C			
28		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	23.2	0	0	
29		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	23	0	0	
30		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	23	0	0	
31		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	0	
32		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	0	
33		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	0	
34		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	0	
35		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.9	0	0	
36		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.8	0	0	
37		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.8	0	0	
38		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
39		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
40		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
41		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
42		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
43		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.7	0	0	
44		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	0	
45		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	0	
46		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	0	
47		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	0	
48		0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	0	4.1E+07	22.6	0	0	

Figure 6-1 – Vibrating Wire logger sample data file

NOTE: When sensor reading is outside of the valid range, the “99999” value will be recorded as the Eng Units and B Units data.

6.2 4 TO 20MA LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:



DT4205_00000000000000_20141105_123123.csv - Microsoft Excel

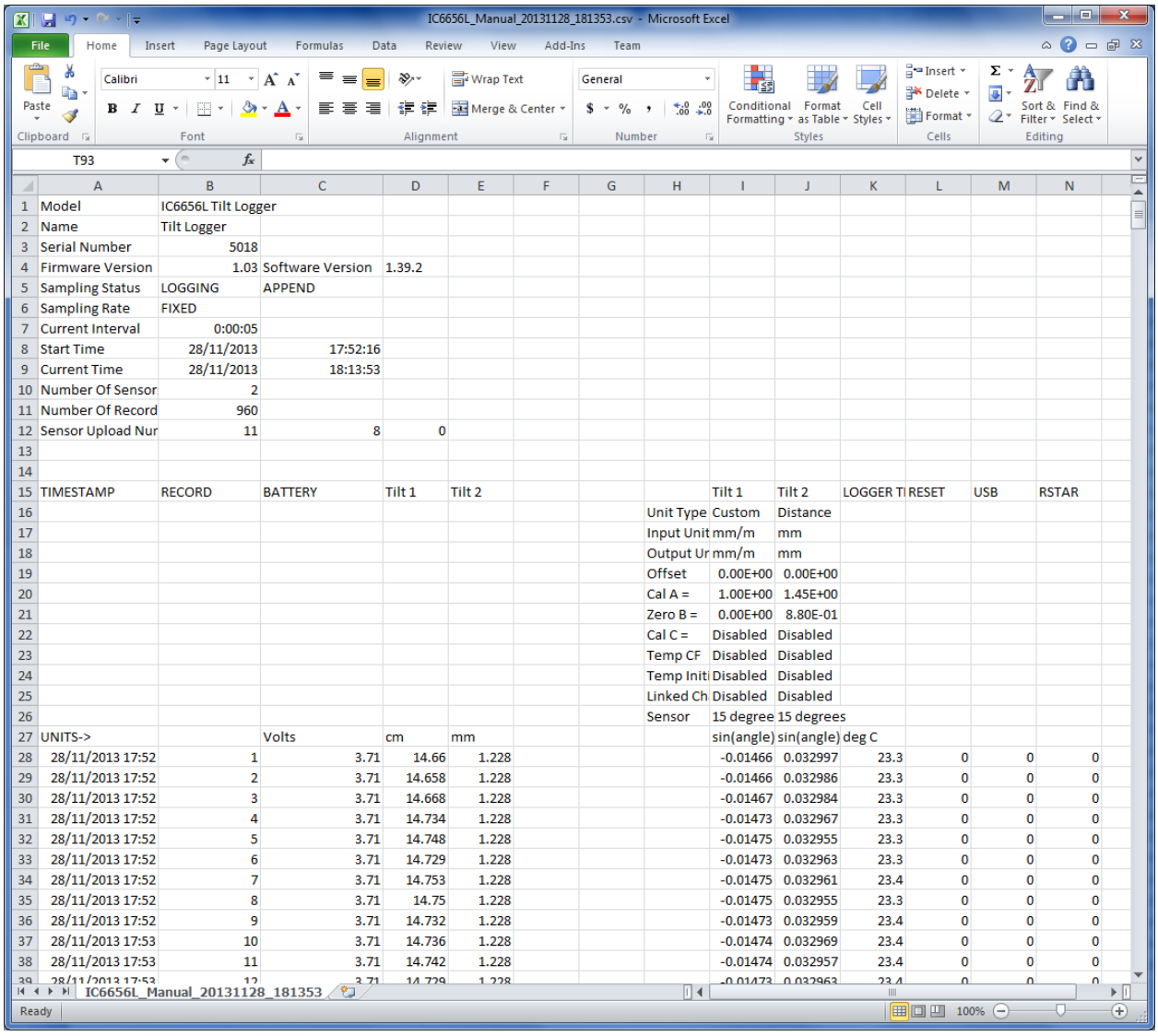
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Model	DT4205 ELE0881B 420mA Multi Channel Logger																						
2	Name	MultiChannel 420mA Logger DT4205																						
3	Serial Number	0																						
4	Firmware Versio	1	Software	1.39.9																				
5	Sampling Status	LOG PENDING																						
6	Sampling Rate	FIXED																						
7	Current Interval	0:00:20																						
8	Start Time	05/11/2014	12:54:34																					
9	Current Time	05/11/2014	12:31:23																					
10	Number Of Sensc	6																						
11	Number Of Recor	110																						
12	Sensor Upload N	8	482022	8A00																				
13																								
14																								
15	TIMESTAMP	RECORD	BATTERY	420mA 1	Therm 1	420mA 2	Therm 2	420 Sensc	TH Sensor				420mA 1	Therm 1	420mA 2	Therm 2	420 Sensc	TH Senso	LOGGER T	RESET	USB	RSTAR	STATUS	
16												Unit Type	Disabled	Disabled	Pressure	Disabled	Distance	Disabled						
17												Input Uni	Disabled	Disabled	kPa	Disabled	mm	Disabled						
18												Output Ur	Disabled	Disabled	kPa	Disabled	mm	Disabled						
19												Offset	Disabled	Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
20												Lower Re	Disabled	Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
21												Upper Re	Disabled	Disabled	1.00E+00	Disabled	1.00E+00	Disabled						
22												Lower Eng	Disabled	Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
23												Upper En	Disabled	Disabled	1.00E+00	Disabled	1.00E+00	Disabled						
24												Linear M	Disabled	Disabled	2.00E+00	Disabled	3.00E+00	Disabled						
25												Linear Ze	Disabled	Disabled	0.00E+00	Disabled	0.00E+00	Disabled						
26												Temp CF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled						
27												Temp Init	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled						
28												Linked Ch	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled						
29												Sensor	420mA	10K NTC	420mA	10K NTC	420mA	10K NTC						
30	UNITS->		Volts	mA	deg C	kPa	deg C	mm	deg C				mA	Ohms	mA	Ohms	mA	Ohms	deg C					
31	05/11/2014 12:54	1	2	4.028738	21.99	8.057	22.02	12.086	22.03				-4.02874	11413.29	-4.02874	11400.96	-4.02874	11391.72	22.3	0	1	0	11	
32	05/11/2014 12:54	2	2	4.028738	22.04	8.057	22.05	12.086	22.06				-4.02874	11390.18	-4.02874	11382.48	-4.02874	11377.87	22.3	0	1	0	11	
33	05/11/2014 12:55	3	2	4.028738	22.02	8.057	22.03	12.086	22.05				-4.02874	11399.42	-4.02874	11391.72	-4.02874	11382.48	22.3	0	1	0	11	
34	05/11/2014 12:55	4	2	4.028738	22.01	8.057	22.03	12.086	22.04				-4.02874	11404.04	-4.02874	11394.79	-4.02874	11388.64	22.3	0	1	0	11	
35	05/11/2014 12:55	5	2	4.028738	21.99	8.057	22	12.086	22.01				-4.02874	11413.29	-4.02874	11408.66	-4.02874	11402.5	22.3	0	1	0	11	
36	05/11/2014 12:56	6	2	4.028738	21.98	8.057	22	12.086	22.03				-4.02874	11417.92	-4.02874	11408.66	-4.02874	11396.33	22.3	0	1	0	11	
37	05/11/2014 12:56	7	2	4.028738	22.02	8.057	22.04	12.086	22.06				-4.02874	11400.96	-4.02874	11390.18	-4.02874	11380.95	22.3	0	1	0	11	
38	05/11/2014 12:56	8	2	4.028738	22	8.057	22.03	12.086	22.04				-4.02874	11407.12	-4.02874	11396.33	-4.02874	11388.64	22.3	0	1	0	11	
39	05/11/2014 12:57	9	2	4.028738	22.02	8.057	22.03	12.086	22.05				-4.02874	11399.42	-4.02874	11391.72	-4.02874	11384.02	22.3	0	1	0	11	
40	05/11/2014 12:57	10	2	4.028738	22.04	8.057	22.06	12.086	22.08				-4.02874	11387.1	-4.02874	11376.34	-4.02874	11368.66	22.3	0	1	0	11	
41	05/11/2014 12:57	11	2	4.028738	22.06	8.057	22.07	12.086	22.09				-4.02874	11380.95	-4.02874	11371.73	-4.02874	11364.05	22.3	0	1	0	11	
42	05/11/2014 12:58	12	2	4.028738	22.05	8.057	22.06	12.086	22.08				-4.02874	11384.02	-4.02874	11377.87	-4.02874	11370.19	22.3	0	1	0	11	
43	05/11/2014 12:58	13	2	4.028738	22.04	8.057	22.06	12.086	22.07				-4.02874	11390.18	-4.02874	11380.95	-4.02874	11374.8	22.3	0	1	0	11	
44	05/11/2014 12:58	14	2	4.028738	22.03	8.057	22.04	12.086	22.06				-4.02874	11394.79	-4.02874	11387.1	-4.02874	11380.95	22.3	0	1	0	11	

Figure 6-2 – 4 to 20mA Logger sample data file

NOTE: When sensor reading is outside of the valid range, the “99999” value will be recorded as the Eng Units and mA Units data.

6.3 TILT LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:



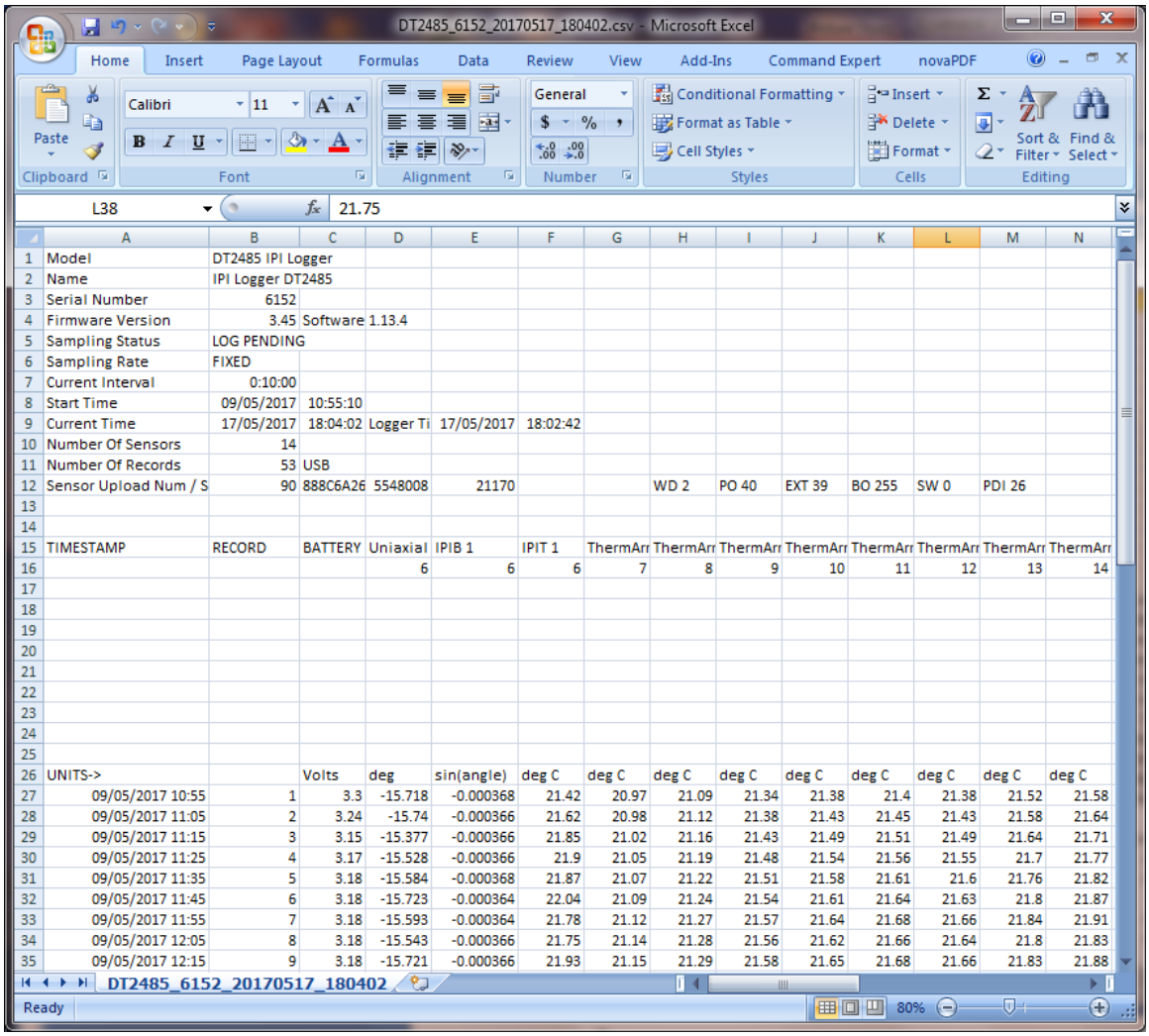
IC6656L_Manual_20131128_181353.csv - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Model	IC6656L Tilt Logger												
2	Name	Tilt Logger												
3	Serial Number	5018												
4	Firmware Version	1.03	Software Version	1.39.2										
5	Sampling Status	LOGGING	APPEND											
6	Sampling Rate	FIXED												
7	Current Interval	0:00:05												
8	Start Time	28/11/2013	17:52:16											
9	Current Time	28/11/2013	18:13:53											
10	Number Of Sensor	2												
11	Number Of Record	960												
12	Sensor Upload Nur	11	8	0										
13														
14														
15	TIMESTAMP	RECORD	BATTERY	Tilt 1	Tilt 2				Tilt 1	Tilt 2	LOGGER TI	RESET	USB	RSTAR
16								Unit Type	Custom	Distance				
17								Input Unit	mm/m	mm				
18								Output Ur	mm/m	mm				
19								Offset	0.00E+00	0.00E+00				
20								Cal A =	1.00E+00	1.45E+00				
21								Zero B =	0.00E+00	8.80E-01				
22								Cal C =	Disabled	Disabled				
23								Temp CF	Disabled	Disabled				
24								Temp Init	Disabled	Disabled				
25								Linked Ch	Disabled	Disabled				
26								Sensor	15 degree	15 degrees				
27	UNITS->		Volts	cm	mm				sin(angle)	sin(angle)	deg C			
28	28/11/2013 17:52	1	3.71	14.66	1.228				-0.01466	0.032997	23.3	0	0	0
29	28/11/2013 17:52	2	3.71	14.658	1.228				-0.01466	0.032986	23.3	0	0	0
30	28/11/2013 17:52	3	3.71	14.668	1.228				-0.01467	0.032984	23.3	0	0	0
31	28/11/2013 17:52	4	3.71	14.734	1.228				-0.01473	0.032967	23.3	0	0	0
32	28/11/2013 17:52	5	3.71	14.748	1.228				-0.01475	0.032955	23.3	0	0	0
33	28/11/2013 17:52	6	3.71	14.729	1.228				-0.01473	0.032963	23.3	0	0	0
34	28/11/2013 17:52	7	3.71	14.753	1.228				-0.01475	0.032961	23.4	0	0	0
35	28/11/2013 17:52	8	3.71	14.75	1.228				-0.01475	0.032955	23.3	0	0	0
36	28/11/2013 17:52	9	3.71	14.732	1.228				-0.01473	0.032959	23.4	0	0	0
37	28/11/2013 17:53	10	3.71	14.736	1.228				-0.01474	0.032969	23.4	0	0	0
38	28/11/2013 17:53	11	3.71	14.742	1.228				-0.01474	0.032957	23.4	0	0	0

Figure 6-3 – Tilt Logger sample data file

6.4 DT2485 LOGGER SAMPLE DATA FILE

The following is how the data appears in Excel:



DT2485_6152_20170517_180402.csv - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Model	DT2485 IPI Logger												
2	Name	IPI Logger DT2485												
3	Serial Number	6152												
4	Firmware Version	3.45	Software	1.13.4										
5	Sampling Status	LOG PENDING												
6	Sampling Rate	FIXED												
7	Current Interval	0:10:00												
8	Start Time	09/05/2017	10:55:10											
9	Current Time	17/05/2017	18:04:02	Logger Ti	17/05/2017	18:02:42								
10	Number Of Sensors	14												
11	Number Of Records	53	USB											
12	Sensor Upload Num / S	90	888C6A26	5548008	21170			WD 2	PO 40	EXT 39	BO 255	SW 0	PDI 26	
13														
14														
15	TIMESTAMP	RECORD	BATTERY	Uniaxial	IPIB 1	IPIT 1	ThermArr	ThermArr	ThermArr	ThermArr	ThermArr	ThermArr	ThermArr	ThermArr
16				6	6	6	7	8	9	10	11	12	13	14
17														
18														
19														
20														
21														
22														
23														
24														
25														
26	UNITS->		Volts	deg	sin(angle)	deg C	deg C	deg C	deg C	deg C	deg C	deg C	deg C	deg C
27	09/05/2017 10:55	1	3.3	-15.718	-0.000368	21.42	20.97	21.09	21.34	21.38	21.4	21.38	21.52	21.58
28	09/05/2017 11:05	2	3.24	-15.74	-0.000366	21.62	20.98	21.12	21.38	21.43	21.45	21.43	21.58	21.64
29	09/05/2017 11:15	3	3.15	-15.377	-0.000366	21.85	21.02	21.16	21.43	21.49	21.51	21.49	21.64	21.71
30	09/05/2017 11:25	4	3.17	-15.528	-0.000366	21.9	21.05	21.19	21.48	21.54	21.56	21.55	21.7	21.77
31	09/05/2017 11:35	5	3.18	-15.584	-0.000368	21.87	21.07	21.22	21.51	21.58	21.61	21.6	21.76	21.82
32	09/05/2017 11:45	6	3.18	-15.723	-0.000364	22.04	21.09	21.24	21.54	21.61	21.64	21.63	21.8	21.87
33	09/05/2017 11:55	7	3.18	-15.593	-0.000364	21.78	21.12	21.27	21.57	21.64	21.68	21.66	21.84	21.91
34	09/05/2017 12:05	8	3.18	-15.543	-0.000366	21.75	21.14	21.28	21.56	21.62	21.66	21.64	21.8	21.83
35	09/05/2017 12:15	9	3.18	-15.721	-0.000366	21.93	21.15	21.29	21.58	21.65	21.68	21.66	21.83	21.88

Figure 6-4 – DT2485 Logger sample data file

7 WIRELESS COMMUNICATION SETTINGS

RST wireless enabled data loggers can be set up to use one of the following modes:

- DT Link Wireless
- RSTAR System

Wireless mode configuration starts in Wireless Settings dialog.

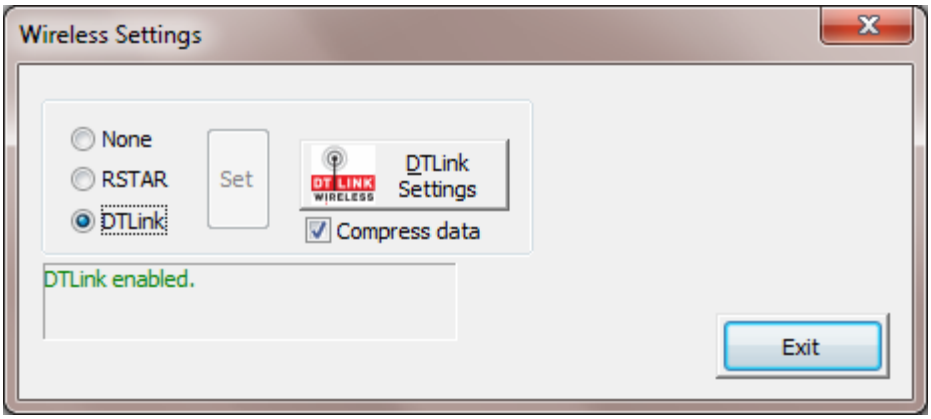


Figure 7-1 – Wireless settings dialog

Depending on selected mode, appropriate controls enable further system configuration.

Refer to section 7.1 for RSTAR System configuration, or section 7.2 for DT Link setup instructions.

7.1 RSTAR ARRAY RADIO SERIES CONFIGURATION

The RSTAR Array Radio Series use wireless technology to provide continuous data acquisition. The RSTAR Node uses the same star topology at the sensor level with a continuously active RTU hub which is accessible via ModBus RTU commands from an RTU Hub interfaced to a FlexDAQ data logger. It is based on the 900 MHz, 868 MHz and 2.4 GHz spread spectrum band (country dependent) with extensive open-country range through use of a simple dipole antenna. A complete RSTAR System is packet-oriented and consists of RSTAR nodes (slaves) and an RTU Hub (master). The RSTAR nodes wake from low-power sleep and collect data from their attached sensors, such as RST's Vibrating Wire Piezometers. This data, which includes module address, hub address, sensor module serial number, diagnostics, data, and CRC check, is then sent (wirelessly) as a packet to the RTU Hub. Upon reception to the FlexDAQ, the RTU Hub will issue an ACK signal which may include clock synchronization and rate data. The RTU Hub stores the data in a temporary register set which is overwritten as new data is received; there is an intermediate data logging function in the RSTAR Node. The data logger within the FlexDAQ has ultimate responsibility for logging data.

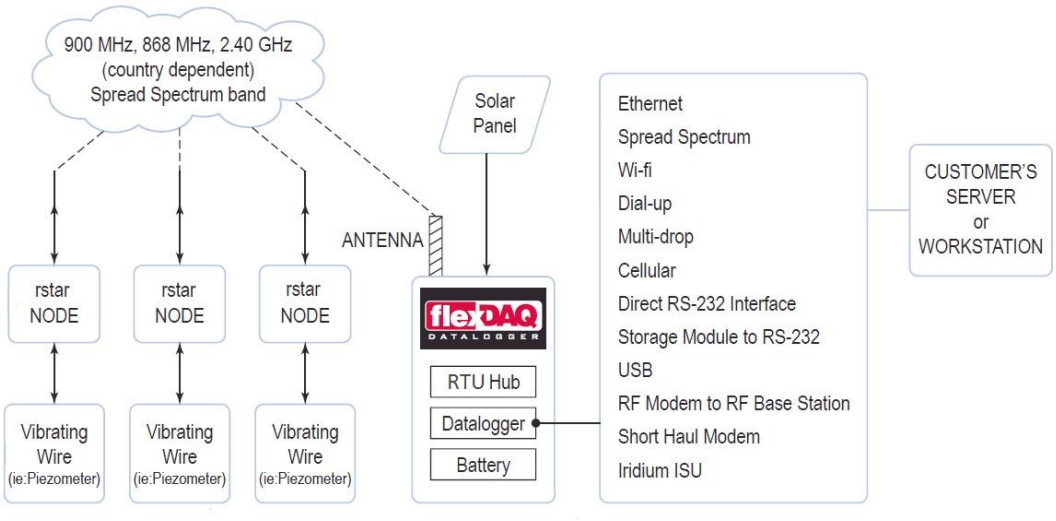


Figure 7-2 – RSTAR configuration diagram

Figure 7-3 – RSTAR-equipped data loggers

Figure 7-4 – RTU hub

A FlexDAQ enclosure shown with an open lid to reveal an installed RSTAR RTU Hub (on DIN rail), data logger, radio, and power supply.

Figure 7-5 – FlexDAQ enclosure

When DT Logger Host software connects to RSTAR compatible device, the RSTAR Setup dialog is accessible from Wireless dialog in Connections tab.

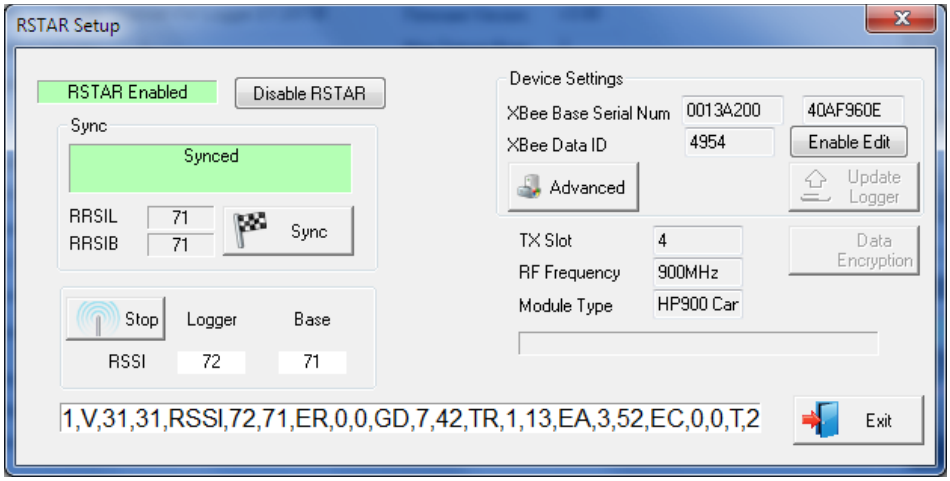


Figure 7-6 – RSTAR setup dialog

NOTE: RST data loggers shipped as part of RSTAR system have all settings preconfigured. It is strongly recommended to contact RST personnel before modifying any RSTAR settings.

The RSTAR can be enabled or disabled on each logger.

Sync

Force a synchronisation with an RTU hub. If an RTU hub is found, the logger settings are updated from an RTU. Connection signal strength is displayed after successful update.

Ping

Send ping commands to an RTU hub. The RTU hub is pooled every few seconds and connection details are shown in real time. The quality of radio connection can be determined from given data.

Device Settings

Every logger in RSTAR system needs to be set up with one RTU base hub. The RTU hub Serial Number and Data ID tells the logger which RTU hub to connect to. These settings are password protected to protect system integrity.

Advanced Settings

Adjustment of other device settings can be performed with assistance of RST Instruments personnel. The Advanced Settings dialog can be used to display various system settings. Use *Query Logger* button to show system status.

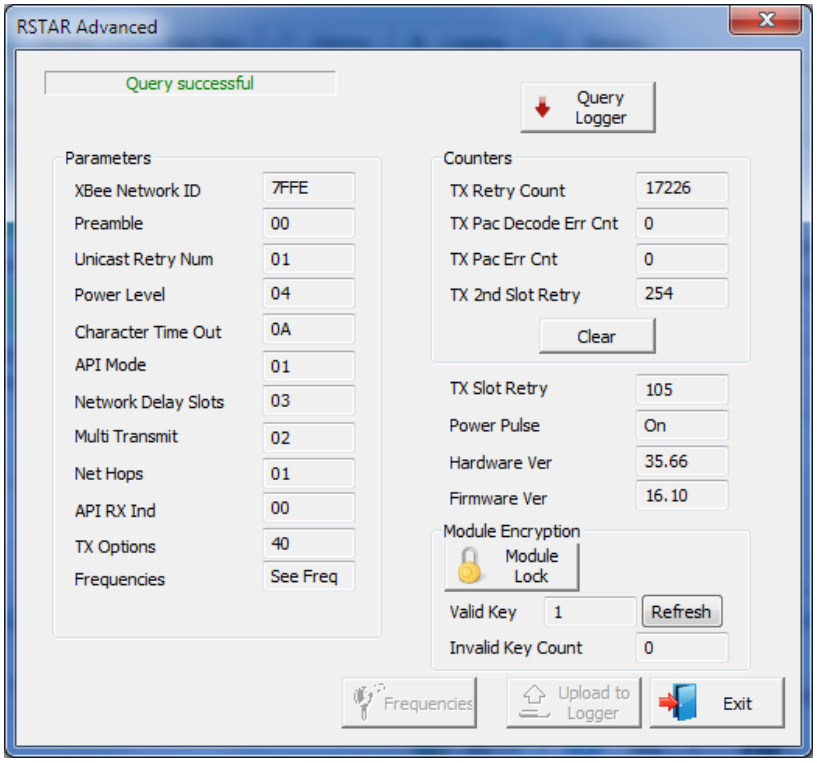


Figure 7-7 – RSTAR advanced settings dialog

NOTE: When the logger is in RSTAR enabled mode, some logger configuration parameters will be controlled by RTU base station. Any such parameters will be inaccessible by DT Logger Host Software.

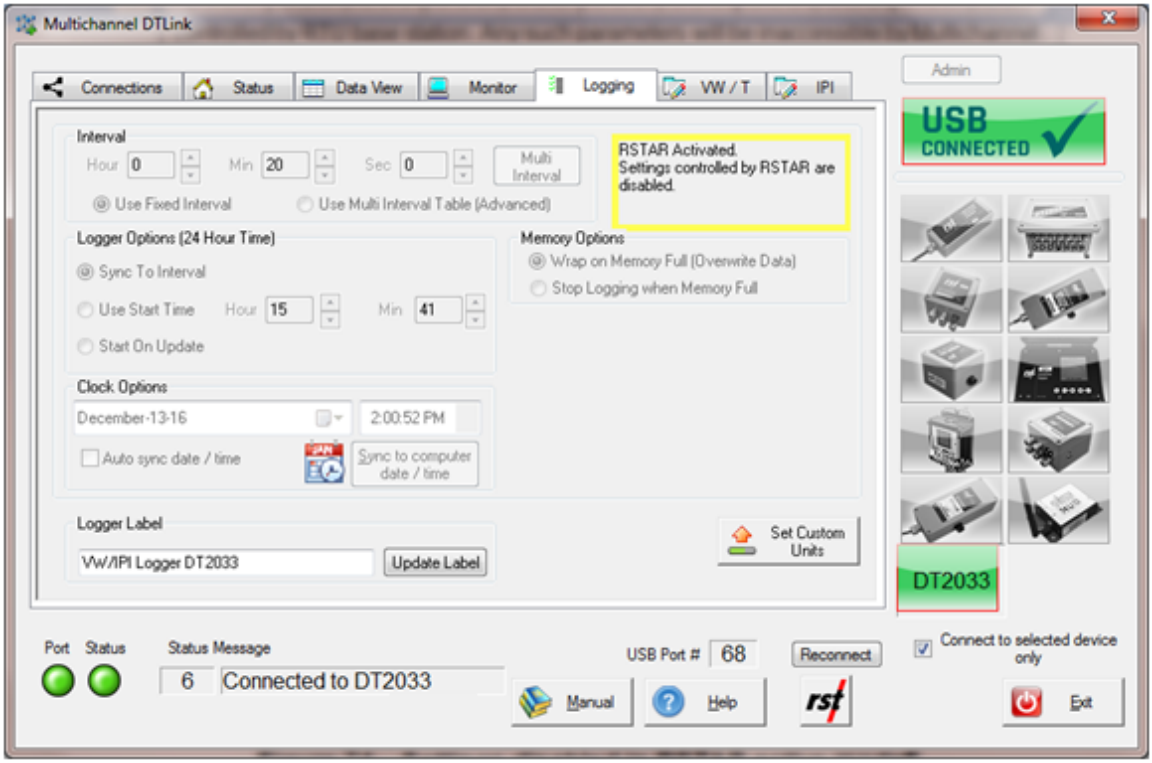


Figure 7-8 – Settings disabled in RSTAR active mode

Consult the RSTAR manual (ELM0077) for detailed sample data and sample calibration information.

7.2 DT LINK CONFIGURATION

The DT Link use wireless technology to provide on demand data acquisition. It is based on the 900 MHz, 868 MHz and 2.4 GHz spread spectrum band (country dependent) with extensive open-country range through use of a simple dipole antenna. DT Link System is packet-oriented and consists of DT Link enabled logger and an DT Link Hub.

When DT Logger Host software connects to DT Link capable device, the DT Link Setup dialog is accessible from Wireless dialog in Connections tab.

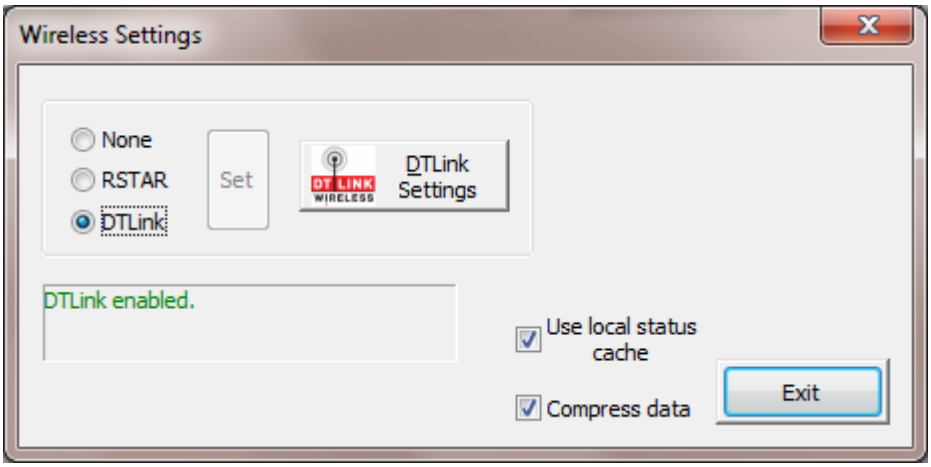


Figure 7-9 – Logger wireless settings dialog

Use local status cache
After successful connection, current logger settings will be saved in local cache file. Enabling local cache will decrease subsequent connections time.

Compress Data
Data compression decrease data download time.

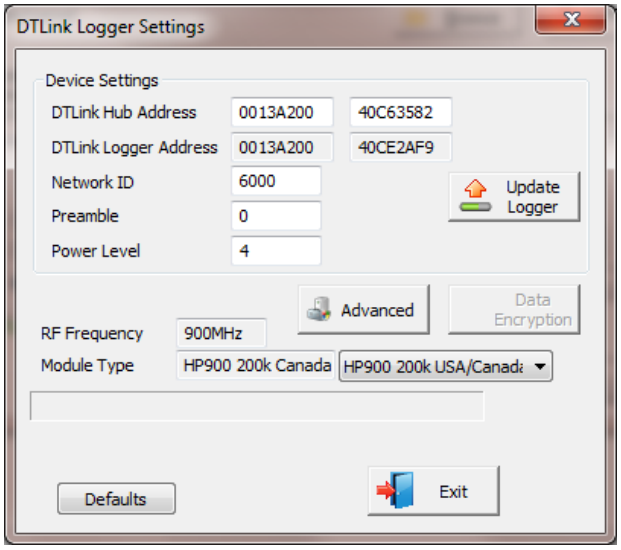


Figure 7-10 – DT Link logger settings dialog

All loggers belonging to the same network need the same Hub Address and Network ID. Advanced settings are for tuning up communication parameters.

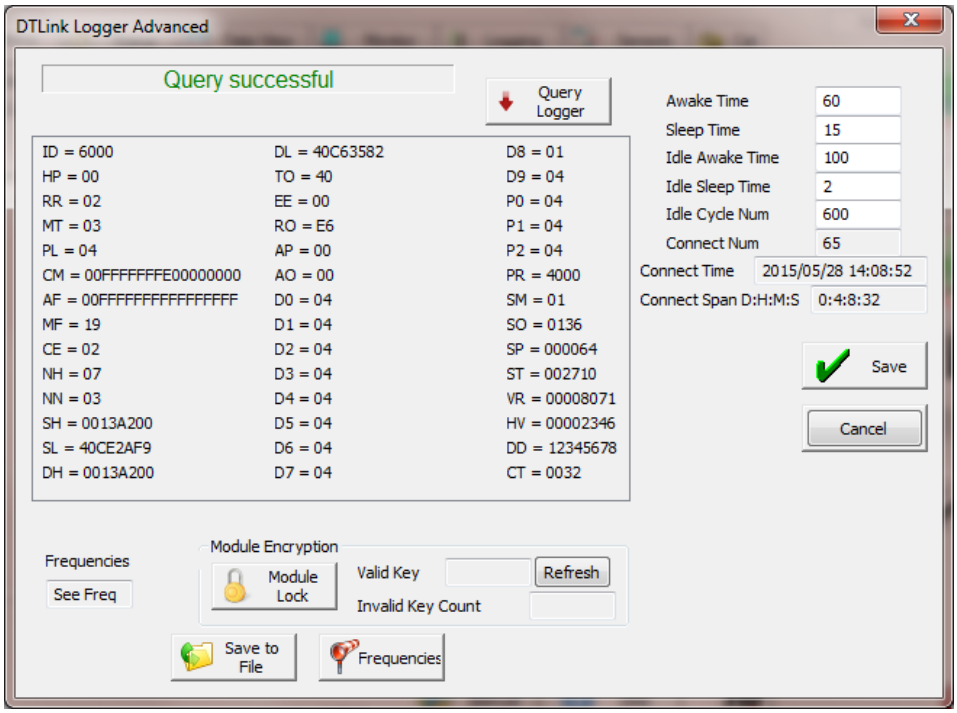


Figure 7-11 – DT Link logger settings dialog

Click *Query Logger* to retrieve all parameters.

NOTE: RST data loggers shipped as part of DT Link system have all settings preconfigured. It is strongly recommended to contact RST personnel before modifying any DT Link settings.

The DT Link can be enabled or disabled on each logger.

8 BATTERIES

8.1 BATTERY DEFINITIONS

Two kinds of batteries are used across the DT Logger range of products: standard and compact. They are summarized in Table 8-1.

Table 8-1 – Battery definitions

Battery Name	Standard Battery	Compact Battery
Battery Type	SAFT LSH 20 D-cell	One SAFT LSH 14 light C-cell Or Two SAFT LS 14500 AA

Standard batteries are defined as SAFT LSH 20 D-cell batteries and can be placed directly into the battery holder inside the logger. Standard batteries are recommended for radio-equipped models but may be used with non-radio loggers.

Compact batteries are defined as either one SAFT LSH 14 light C-cell battery or two SAFT LS 14500 AA batteries and require the use of the appropriate adaptor prior to placement in the battery holder. Compact batteries are recommended for stand-alone loggers. Both compact battery options are designed to support the same level of performance in DT loggers and are considered equivalent.

8.2 Monitoring Remaining Battery Life

To determine the remaining battery life, connect the DT Logger to a computer or Field PC with a USB cable and launch the DT Logger Host program. Once the software connects to the logger, the status of the battery, including the voltage and current battery life, is displayed (highlighted in the red box in Figure 8-1).

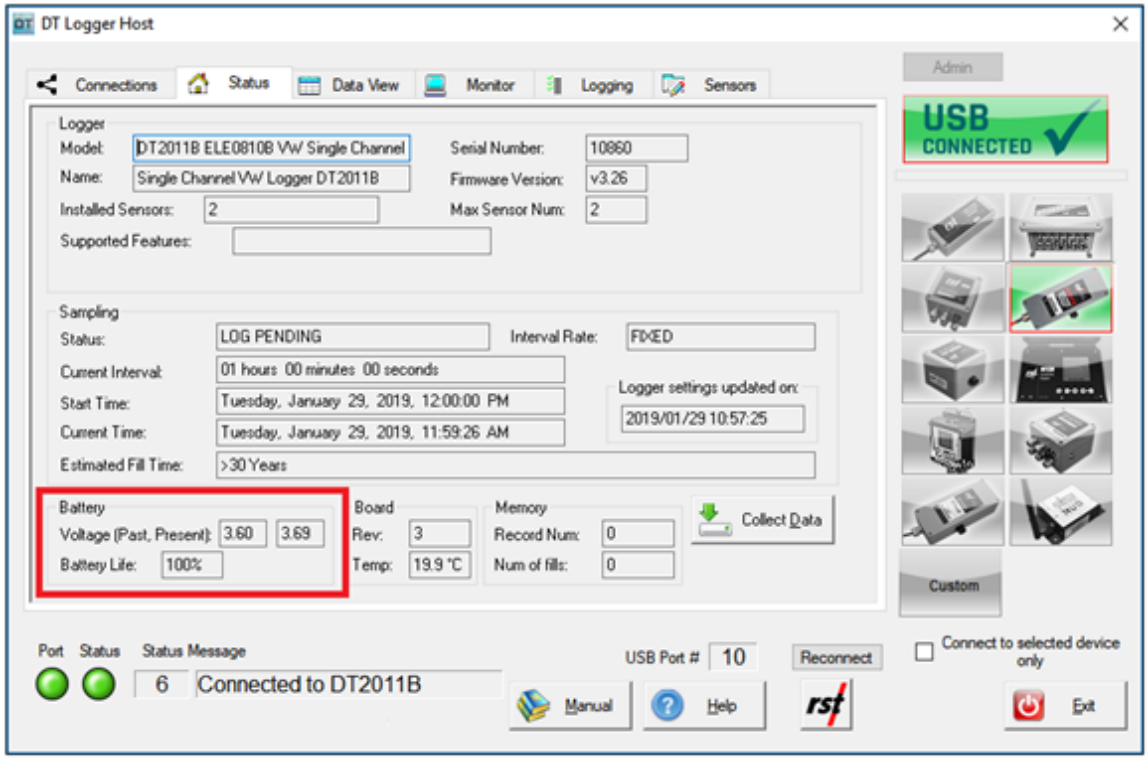


Figure 8-1 – Battery status on DT Logger Host

WARNING: When operating at lower than 0°C or higher than +40°C, the capacity of the lithium battery will decrease. The Battery Life indicator on DT Logger Host may overestimate the remaining battery life at temperatures outside this range.

NOTE: Batteries should be replaced when the Battery Life estimates there is less than 20%

8.3 Battery Life Estimations in Data Loggers

The DT series loggers are purpose built with the battery capacities required to support static applications over a long period of time. Readings should be taken at a rate of once

every hour or longer. The reading interval can be set to less than an hour, but this will significantly decrease overall battery life. Table 8-2 details estimates battery life for DT data loggers set at 1-hour, 10-minute and 1-minute reading intervals in typical operating environments.

See Section 8.1 for definitions of standard and compact batteries.

Table 8-2 – Battery life estimations

Data Logger Configuration	Reading Interval	Radio	Compact battery	Standard battery
DT2011B, 1 VW/thermistor pair	1 hour	none	4 years	4 years
		RSTAR	*n/a*	4 years
		DT Link	*n/a*	4 years
	10 minutes	none	4 years	4 years
		RSTAR	*n/a*	2 years
		DT Link	*n/a*	3 years
	1 minute	none	6.5 months	2 years
		RSTAR	*n/a*	2.5 months
		DT Link	*n/a*	1 year
DT2055B, 5 VW/thermistor pairs	1 hour	none	4 years	4 years
		RSTAR	*n/a*	4 years
		DT Link	*n/a*	3.5 years
	10 minutes	none	1 year	3.5 years
		RSTAR	*n/a*	1.5 years
		DT Link	*n/a*	2 years
	1 minute	none	1 month	4.5 months
		RSTAR	*n/a*	2 months
		DT Link	*n/a*	4 months
DT2040, 20 VW/thermistor pairs	1 hour	none	1.5 years	4 years
		RSTAR	*n/a*	3 years
		DT Link	*n/a*	2 years
	10 minutes	none	3 months	1 year
		RSTAR	*n/a*	6.5 months
		DT Link	*n/a*	9.5 months
	1 minute	none	10 days	1 month
		RSTAR	*n/a*	19 days
		DT Link	*n/a*	1 month
DT2485, 3 IPIs *1-minute reading intervals are not recommended due to high power requirements.	1 hour	none	*n/a*	4 years
		RSTAR	*n/a*	4 years
		DT Link	*n/a*	2.5 years
	10 minutes	none	*n/a*	12 months
		RSTAR	*n/a*	10 months
		DT Link	*n/a*	9.5 months
	1 minute*	none	*n/a*	46 days
		RSTAR	*n/a*	39 days
		DT Link	*n/a*	44 days
DT2485, 10 IPIs *1-minute reading intervals are not recommended due to high power requirements.	1 hour	None	*n/a*	2 years
		RSTAR	*n/a*	1.5 years
		DT Link	*n/a*	1 year
	10 minutes	None	*n/a*	4 months
		RSTAR	*n/a*	3.5 months
		DT Link	*n/a*	3.5 months
	1 minute*	None	*n/a*	16 days
		RSTAR	*n/a*	14 days
		DT Link	*n/a*	15 days
DT2485, 30 IPIs 1-minute reading intervals are not recommended due to the reading rate (approximately 90 seconds) and high-power requirements.	1 hour	none	*n/a*	7.5 months
		RSTAR	*n/a*	7 months
		DT Link	*n/a*	6.5 months
	10 minutes	none	*n/a*	1 month
		RSTAR	*n/a*	1 month
		DT Link	*n/a*	1 month

Data Logger Configuration	Reading Interval	Radio	Compact battery	Standard battery
DTSAA, 10 Segments *1-minute reading intervals are not recommended due to high power requirements.	1 hour	None	*n/a*	5 years
		RSTAR	*n/a*	5 years
		DT Link	*n/a*	*n/a*
	10 minutes	None	*n/a*	5 years
		RSTAR	*n/a*	3.8 years
		DT Link	*n/a*	*n/a*
DTSAA, 50 Segments *1-minute reading intervals are not recommended due to high power requirements.	1 hour	None	*n/a*	5 years
		RSTAR	*n/a*	5 years
		DT Link	*n/a*	*n/a*
	10 minutes	None	*n/a*	2.6 years
		RSTAR	*n/a*	1.3 years
		DT Link	*n/a*	*n/a*
DTSAA, 100 Segments *1-minute reading intervals are not recommended due to high power requirements.	1 hour	None	*n/a*	5 years
		RSTAR	*n/a*	3.4 years
		DT Link	*n/a*	*n/a*
	10 minutes	None	*n/a*	9 months
		RSTAR	*n/a*	7 months
		DT Link	*n/a*	*n/a*
DTSAA, 200 Segments *1-minute reading intervals are not recommended due to high power requirements.	1 hour	None	*n/a*	1.5 years
		RSTAR	*n/a*	1.2 years
		DT Link	*n/a*	*n/a*
	10 minutes	None	*n/a*	2 months
		RSTAR	*n/a*	2 months
		DT Link	*n/a*	*n/a*
DTL201B, DTL202B	1 hour	none	*n/a*	4 years
		RSTAR	*n/a*	4 years
		DT Link	*n/a*	2.5 years
	10 minutes	none	*n/a*	1 year
		RSTAR	*n/a*	1 year
		DT Link	*n/a*	1 year
	1 minute	none	*n/a*	1.5 months
		RSTAR	*n/a*	1 month
		DT Link	*n/a*	1.5 months
DT4205* *Estimations heavily depend on the number of sensors and the conditions under which the logger operates. These estimations are based on 10 sensors (5 4-20 mA sensors and 5 thermistors) with a 4-20 mA sensor reading time of 4 seconds and sensor output current of 12mA at 24°C	1 hour	none	*n/a*	3.6 years
		RSTAR	*n/a*	3.4 years
		DT Link	*n/a*	2.4 years
	10 minutes	none	*n/a*	7 months
		RSTAR	*n/a*	7 months
		DT Link	*n/a*	7 months
	1 minute	none	*n/a*	23 days
		RSTAR	*n/a*	21 days
		DT Link	*n/a*	23 days
DT2306, 18 potentiometers	*Same performance as DT2055, or better*			
DT2350, 2 load cells	*Same performance as DT2055, or better*			

Given that battery life is dependent on a number of different variables, battery life can vary from the values shown in Table 8-2.

It is important to note that:

- This table is intended as a guideline. Battery life is best monitored via DT Logger Host (see Section 8.2).
- The values in Table 8-2 are interpolations based on laboratory measurements.

- Standard batteries are recommended for loggers equipped with RSTAR and DT Link.
- Compact batteries should be used for non-radio loggers only.
- The best battery performance will be observed in a typical environment, with temperatures between 0°C and +40°C. Loggers operating outside of this range will experience reduced battery capacity and decreased battery life.

8.4 CURRENT DT LOGGER AND GAA2820 BATTERY REPLACEMENT INSTRUCTIONS

This section outlines the battery replacement procedure for current DT loggers and the GAA2820. Current DT loggers are DT2011B, DT2055B, DT2040, DT4205, DT201B, DT202B, DT2306, DT2485, DT2350, and DTSAA.

The following steps outline the battery replacement procedure:

CAUTION: Prior to beginning the replacement procedure, ensure that the correct batteries are being used. Standard batteries are highly recommended with wireless (i.e. RSTAR and DT Link) loggers. Compact batteries will not work with wireless loggers.

1. Connect to the data logger via the USB cable and download the data.
2. Disconnect the logger from the computer and remove the top cover (4 Phillips screws).
3. Lift the battery from the negative terminal and remove the battery from the carrier. Replace it with a new one, maintaining the correct polarity.

NOTE: Data loggers powered by compact batteries will house batteries in an adapter, which sits in the battery carrier. Remove the adapter before removing the batteries. Place new batteries into the adapter, then place the adapter into the carrier in the logger.

4. Replace the logger's lid.
5. Connect the logger to the PC again and navigate to the *Connections* screen. Click on *Advanced* button and then on *Initialize Battery*.
6. Switch to the *Logging* screen. Verify that the settings are correct and press the *Apply Settings* button. You must press *Apply Settings* to reset the data logger regardless of whether any parameters have been changed.

CAUTION: When replacing the batteries, it is important to connect to the data logger and re-apply the data logger logging settings. This re-initializes the data logger and ensures that the time settings are correct. Failure to do this could result in improper time stamps after the batteries are replaced.

9 TROUBLESHOOTING

9.1 CONNECTION PROBLEMS

Upon launching, DT Logger Host, software will try to connect to the logger using current communication settings. Once connected, the port and status indicators turn green and the *Status* screen should display logger information.

The connection status is displayed on status bar. If the connection fails (status indicators are red or yellow, or status screen shows no status data), take note of the message and number displayed, then find the corresponding description in Table 9-1.

Port not open: The communication port is being used by some other application.
Solution: Close other windows applications that might be using serial port assigned to the Logger. Select the correct logger type using logger mode buttons.

1. Connecting to the logger message continuously displayed.
   Solution: Verify that the communication cable is connected and connections are tight. Replace logger batteries with fresh set.
2. State Errors, Reading Errors, Memory Read Errors.
   Solution: Check the battery status on the *Status* screen on DT Logger Host; replace if necessary. Check cable for damage. Replace communication cable if in doubt.

9.2 SOFTWARE STABILITY

The DT Logger Host real time readout relies on continuous data transmission over serial communication port. This transmission may be occasionally interrupted by other computer activity resulting with program freezing or displaying erroneous data. If this happens, DT Logger Host needs to be closed down and restarted. Check battery state regularly, as a drained battery might cause data transmission errors. Always close software when changing loggers or reconnecting serial communication cable.

Data Collection Help

In case of accidental data loss, the Memory Dump feature can be used to save data logger memory contents. RST Instruments personnel can recover some or all customer data from dump files, providing data is not corrupted and it was not overwritten. Only raw data in B units can be recovered from dump files. Select Memory Dump in Advanced Options to write entire memory contents into a disk file in data folder.

NOTE: The Memory Dump feature is included for emergency memory content retrieval. Under any circumstances, memory dump files should not be used for data collecting.

9.3 STATUS MESSAGES

The following table lists the status bar messages with descriptions.

Table 9-1 – Status messages

#	Status Message	Description
1	Communication port open	Communication port is open
2	Unable to open communication port	Some other application is using this port
3	Connecting to the logger	DT Logger Host is trying to connect to the logger
4	Connection not established	DT Logger Host was unable to connect to the logger
5	Connection established to the logger	DT Logger Host was able to connect to the logger
6	Reading logger settings	All logger settings are copied to the DT Logger Host for display
7	Error during settings read	Error occurred during settings read
8	Idle	Idle time between status or data reads
9	New logger detected	Logger exchanged with another logger; DT Logger Host reset
10	Logger settings successfully read	All logger settings were successfully transferred to DT Logger Host
11	Error reading logger settings	Error occurred during reading logger settings
12	Connection Error	Connection attempts timed out
13	Reading logger memory	Logger memory contents is being copied to the DT Logger Host
14	Writing logger settings	All displayed settings are being transferred to the logger
15	Error during settings write	Error during settings write

10 RST DATALOGGER USB DRIVER SET INSTALLATION

The DT Logger Host software requires a set of drivers installed on the host computer in order to communicate over USB communication port. All steps must be completed for USB communication to work correctly.

The following outlines a procedure for installing the DT2055 Controller Driver Set on Microsoft™ Windows 7, 8, 8.1 and Microsoft™ Windows 10 platforms. Installation steps for DT2055B, DT2040, IC6656, DTL201B-2B, DT4205, DT2306, DT2350, GAA2820, DTSAA and DT2011B Loggers are the same. The actual screenshots may differ, but the steps will be very similar.

10.1 MICROSOFT™ WINDOWS 7, 8 ,8.1 ,10 INSTALLATION PROCEDURE

After successful DT Logger Host Software installation, click on *Install USB Drivers* in *Tools* section of DT Logger Host program group. DT Logger Host group should reside under *RST Instruments* start menu by default. The following are the installation instructions for DT2055 logger. DT2055B, DT2040, IC6656, DTL201B-B, DT4205, DT2306, DT2350, GAA2820,

DTSAA, and DT2011B Loggers driver installation steps are very similar.
The USB driver setup starts showing following dialog:

Figure 10-1 – New Hardware wizard for device

Click **Next** to proceed with the USB driver installation.

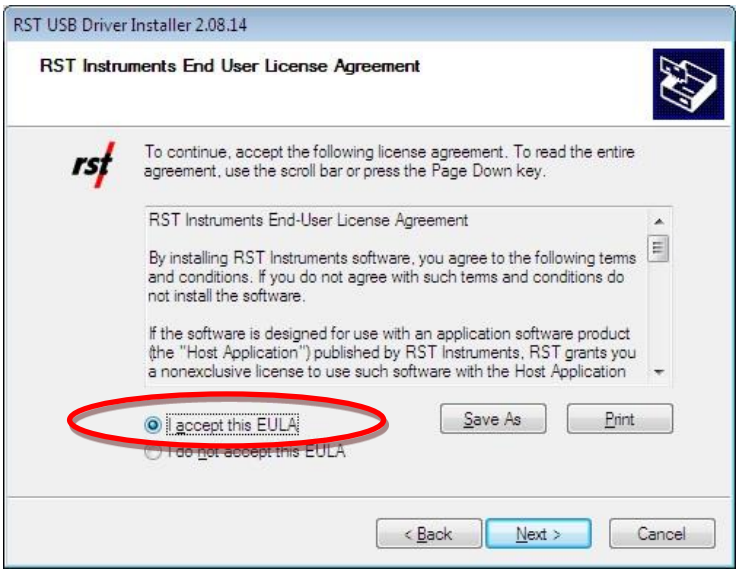


Figure 10-2 – New Hardware wizard for device – choose install

Select your acceptance of RST Instruments End User License Agreement, click ***Next***.

Figure 10-3 – New Hardware wizard for device – install complete

After successful installation of USB to UART device drivers, the Multichannel Datalogger should be connected to the host computer. The MS Windows system should detect the new device and display the yellow message balloon in the lower right-hand corner stating that all device drivers are installed and ready to use.

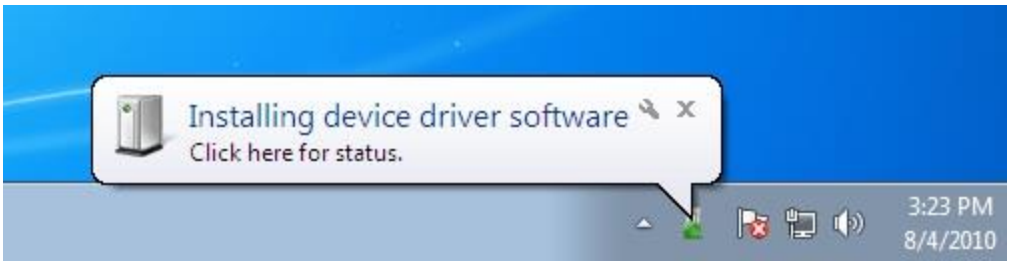


Figure 10-4 – New Hardware wizard for controller – install complete

Open the Device Manager (located in "Control Panel\System", click "Device Manger") and expand "Ports" branch. The device appears as an "RST DT2055 Multichannel Logger" (Figure 10-5).

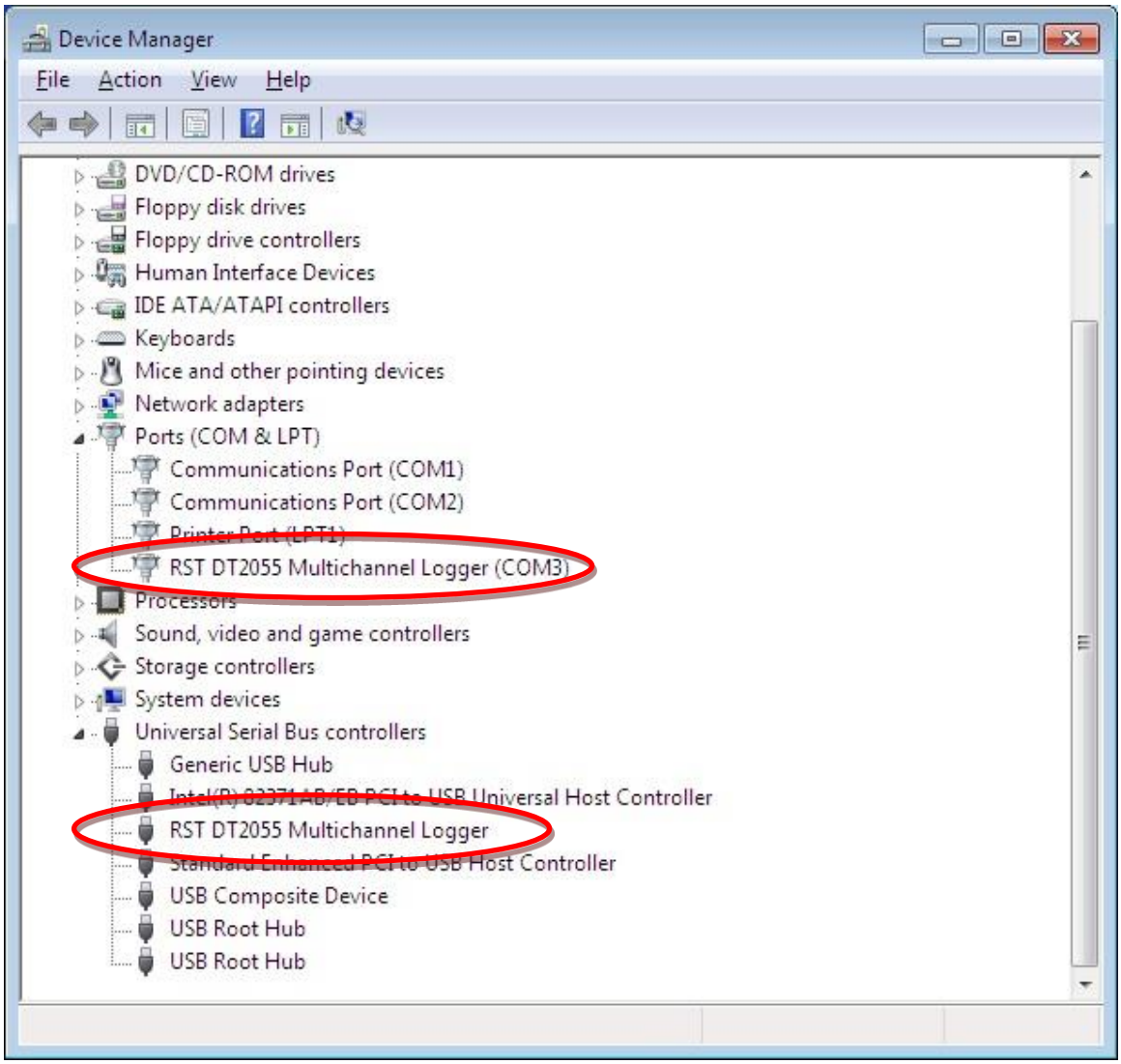


Figure 10-5 – Windows 7, 8, 8.1, 10 Device Manager

If the driver was installed correctly, the RST DT2055 Multichannel Readout port will appear as in Figure 10-5 above. If the driver has not been installed correctly, yellow exclamation mark will appear next to the device. Once the above has been verified, note the COM number which has been assigned to the USB serial port. This will vary from computer to computer, in this example it is COM3.
Close the device manager and launch the DT Logger Host Software. The DT Logger Host Software should now connect to the logger. Confirmation can be made by looking at the status bar (Figure 5-1).

11 SPECIFICATIONS

Table 11-1 – RST L900 Radio and Antenna Kit

Manufacturer	RST Instruments
Model	L900
Operating Frequency	866MHz, 900MHz, 2.4 GHz
Gain	5.5 DBi
Impedance	50 Ohm
VSVR	< 2.0
Weight, Length, Diameter	20 G, 208 mm, 13 mm
Connector	Reverse Polarity
Operating Temperature	-40 °C TO 85 °C
Flame Rating	UL94HB
Polarization	Vertical
RoHS Compliant	Yes
Radiation Pattern	Omnidirectional